Installation and Maintenance Manual IM 919-5

Group: **Applied Air Systems**
Part Number: **IM919-5**
Date: **March 2024**

MicroTech® Unit Controller for Commercial Rooftop Systems, Applied Rooftop Systems and Self Contained Air Conditioners

Models: DPS, MPS, RAH, RCS, RDS, RDT, RFS, RPE, RPS, SWP and SWT

Table of Contents

Introduction

This manual contains information regarding the MicroTech® unit controller used in the Daikin Applied Rooftop and Self Contained product lines. It describes the MicroTech components, input/output configurations, field wiring options and requirements, and service procedures. For a description of operation and information on using the keypad to view data and set control parameters, refer to the appropriate operation manual. For installation and commissioning instructions and general information on a particular unit model, refer to its model-specific installation manual.

Table 1: Operation, Installation and Maintenance Resources

Unit	Manual
MicroTech Rooftop and Self Contained Unit Controller Protocol Information	ED 15112-16
Rooftop/Self Contained Operation	OM 920
MicroTech Remote Unit Interface	IM 1005
RPS/RDT/RFS/RCS 015C-105C	IM 926
RPS/RDT/RFS/RCS 015D-140D	IM 893
SWP Self Contained (012H-130H)	IM 1032
RoofPak RAH/RDS	IM 987
Maverick II Rooftop 62-75 ton	IM 991
Maverick II Rooftop 15-50 ton	IM 1058

NOTICE

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

⚠ WARNING

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

This equipment must be properly grounded. Connections and service to the MicroTech unit 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 unit controller is designed to operate in ambient temperatures from -20°F to 125°F. It can be stored in ambient temperatures from -40°F to 140°F. It is designed to be stored and operated in relative humidity up to 95% (non-condensing).

⚠ WARNING

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.**

⚠ WARNING

Warning indicates potentially hazardous situations for PVC (Polyvinyl Chloride) and CPVC (Clorinated Polyvinyl Chloride) piping in chilled water systems. In the event the pipe is exposed to POE (Polyolester) oil used in the refrigerant system, the pipe can be chemically damaged and pipe failure can occur.

General Description

The MicroTech Unit Controller is a microprocessor-based controller designed to provide sophisticated control of Daikin Applied Air Handling unit. 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 the keypad/display. The controller includes password protection against unauthorized or accidental control parameter changes.

This MicroTech unit 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, and LonMark®. Refer to manual ED15112 for point listings for all protocols.

Component Data

The main components of the MicroTech unit control system include the main control board (MCB) with a built in keypad/display and I/O's, Expansion Modules A, B, C, D, E. Transformers T2, T3 and T9 supply power to the system. The following pages contain descriptions of these components and their input and output devices.

Main Control Board (MCB)

Figure 1: Main Control Board

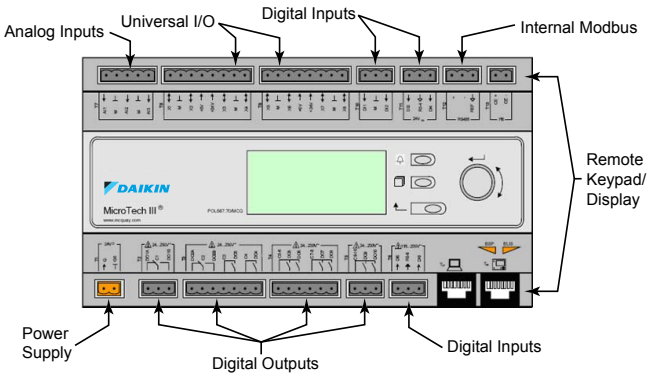


Figure 2: Expansion Boards A, B, C, D, E

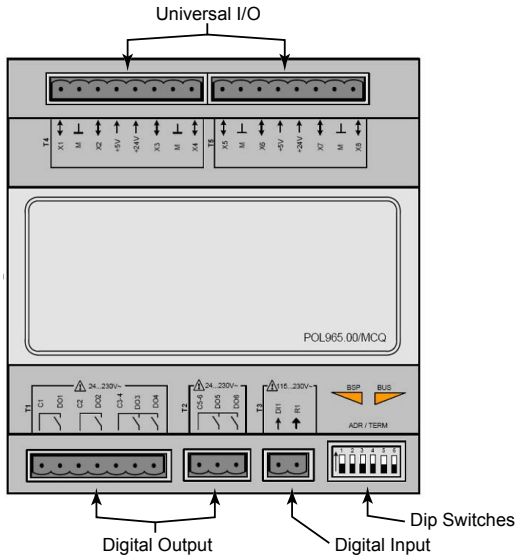


Figure 3: Expansion Board Side Views

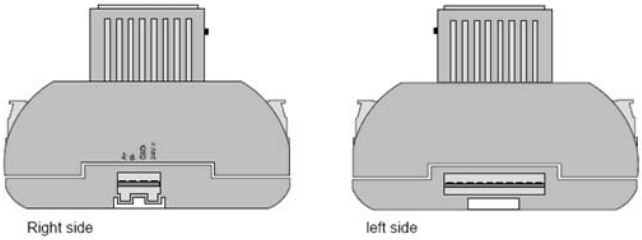


Figure 4: Dip Switch Settings

Expansion Board A	Switch #5 in the up position (all others down)	
Expansion Board B	Switch #4 in the up position (all others down)	
Expansion Board C	Switch #4 and #5 in the up position (all others down)	
Expansion Board D	Switch #3 in the up position (all others down)	
Expansion Board E	Switch #3 and #5 in the up position (all others down)	
Dipswitch #6	Switch #6 **must** be in the up position on the last expansion board in the string regardless whether it is A, B, C, D, or E.	

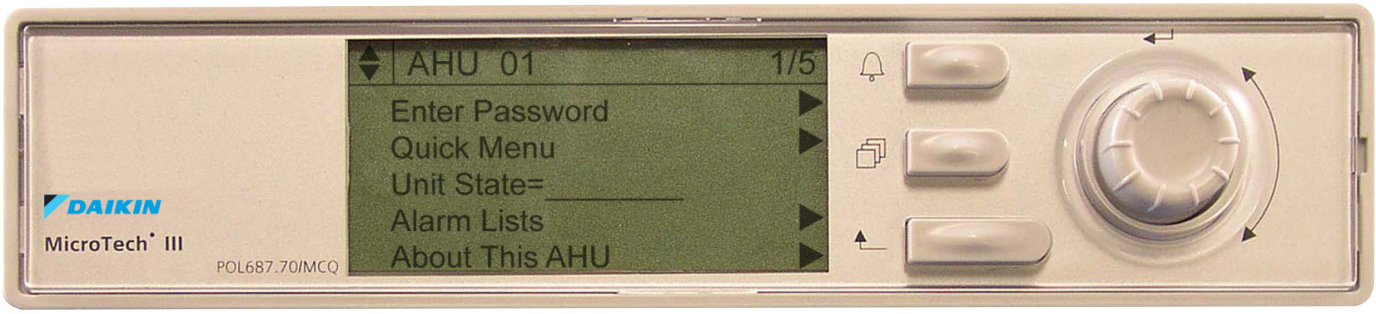
Table 2: MCB I/O Connection Labeling

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

Keypad/Display

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

Figure 5: Keypad/Display



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

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

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

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

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

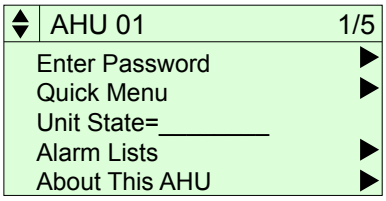
Passwords

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

NOTE: Alarms can be acknowledged without entering a password.

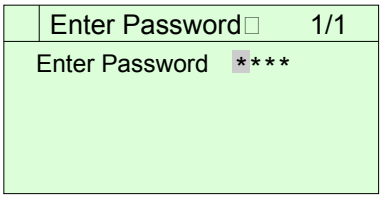
The main password page is displayed when the keypad/display is first accessed, the Home Key is pressed, the Back Key is pressed multiple times, or if the keypad/display has been idle longer than the Password Timeout (default 10 minutes). The main password page provides access to enter a password, access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

Figure 6: Password Main Page



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

Figure 7: Password Entry Page



Entering an invalid password has the same effect as continuing without entering a password. Once a valid password has been entered, the controller allows further changes and access without requiring the user to enter a password until either the password timer expires or a different password is entered. The default value for this password timer is 10 minutes. It is changeable from 3 to 30 minutes via the Timer Settings menu.

Navigation Mode

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

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

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

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

When the Alarm Button is pressed, the Alarm Lists menu is displayed.

Edit Mode

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

Remote Keypad Display Option

The remote user interface is designed for display, system configuration, set-up and management of Daikin Applied applied air units equipped with MicroTech unit controllers.

In addition to the unit-mounted user interface provided with MicroTech unit controllers, Daikin Applied HVAC (applied rooftop systems, indoor vertical self contained systems, or commercial rooftop systems) can be equipped with a remote user interface that handles up to eight units per interface. The remote user interface provides access to unit diagnostics and control adjustments. The remote user interface provides the same functionality as the unit-mounted controller.

About this AHU

The About this AHU menu item provides the user with the current APP version (application code version), the configuration code string for this unit, the BSP version (firmware version) as well as the HMI/OBH GUID version (software identifiers). Each new release of application code will have a unique set of software identifiers. The information shown in the HMI/OBH GUID version will list the information needed to verify a match to the APP version.

Software Upgrade Procedures

Use this procedure to upgrade the MicroTech unit controller application software and firmware.

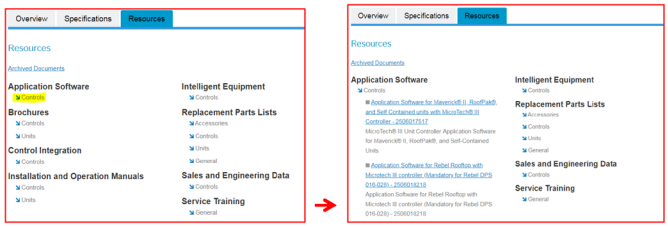
Tools Required:

- 3/64" (1 mm) Allen Key
- Flat head screw driver to open control panel door
- SD memory card no larger than 2GB for firmware less than 8.46 (Click Here to Purchase)
- SD memory card no larger than 8GB formatted to FAT32 for firmware greater than 8.46 (Click Here to Purchase)
- SD memory card no larger than 32GB formatted to FAT32 for firmware 10.36 or greater (Click Here to Purchase)

NOTE: If the controller has a BSP version older than 8.40 or the APP version is earlier than 2506017300 contact Daikin Applied's Technical Response group for support.

Preparing the SD Card

1. To download the software code files online, navigate http://www.daikinapplied.com.
2. Click on the Products tab. Then scroll down and click on Controls. Click on the Resources tab. Under Application Software, click on Controls.

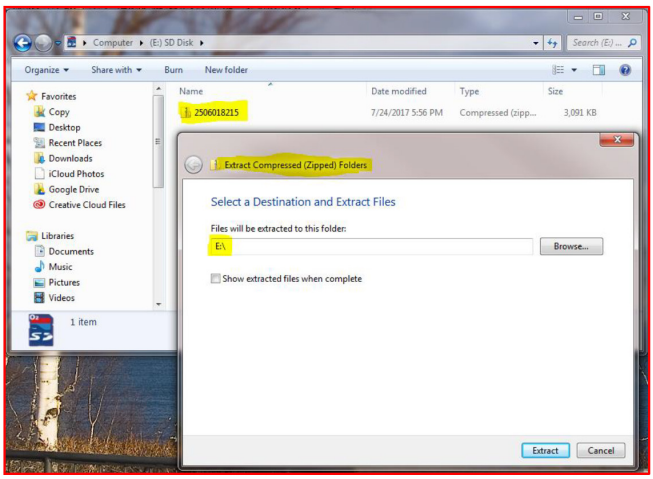


3. Scroll down to find the appropriate software version to download and save it to the Desktop.
   a. 2506017xxx represents Roofpack, Maverick (MPS), and Self Contained (SWP, SWT) code.
   b. 2506018xxx represents Rebel (DPS) code.

NOTE: (XXX) changes as the software versions are revised for the respective product lines.

4. Drag the zip file to the freshly formatted SD card and e
4. xtract it to the root directory of the SD card. See picture below as an example of where the zip file resides on the SD card (E:\) directory.

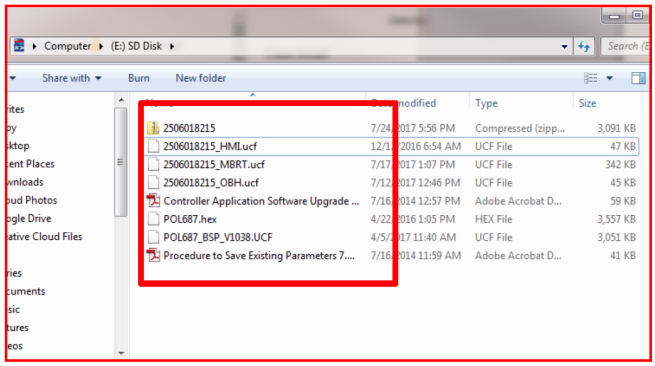
NOTE: Every computer will have a different drive letter designation for the SD card. Root directory represents the first location that appears when opening the SD card since the MicroTech unit controller cannot see files from any folders. Zip file names would change as mentioned in step 3 once new software versions are released.



5. Once all the files are extracted there will be a total of 8 – 9 files appearing on the SD card. Total files counts can change with new software revisions. The list below show 4 - 5 critical files needed for a software download.

- HMI.ucf
- MBRT.ucf
- OBH.ucf
- POL687.ucf
- POL687.hex (omitted after 513 and 214 codes)

Complete list of files including all critical ones shown below

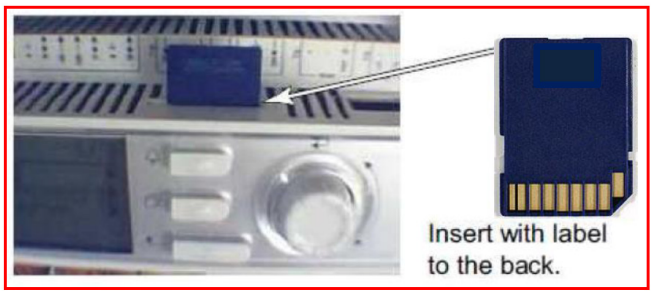


6. This completes preparing the SD card for the download process and should now be taken to the MicroTech controller.

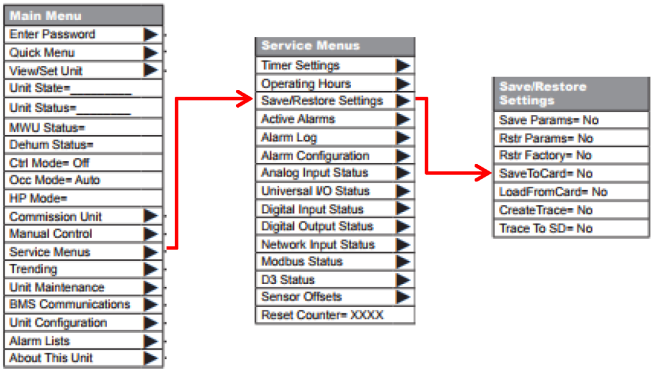
Saving Parameters to an SD Card

NOTE: DO NOT save parameters if the controller experienced a glitch in its operation and skip to the "Download Software to the Controller" section of this SIL.

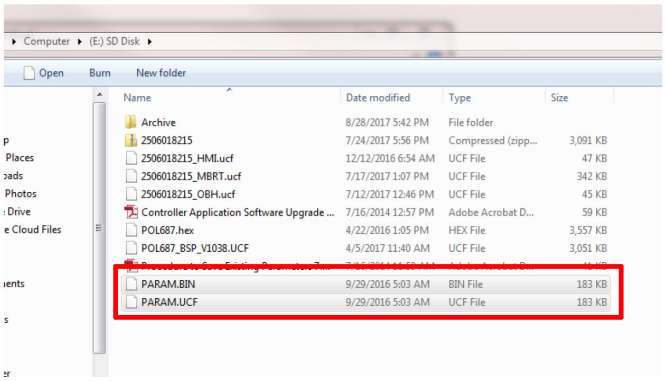
1. Enter the level 2 password.
2. From the Main Menu, set the Control Mode to Off.
3. Insert the SD memory card into the controller's memory card slot.
   a. The label on the card should be facing to the rear, toward the controller.



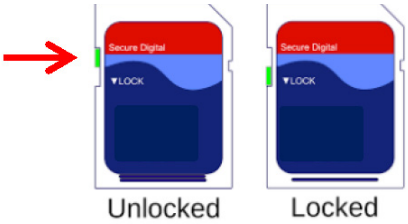
4. Save the existing configuration and parameters to the memory card.
   a. From the Main Menu select Service Menus then Save/Restore Settings.
   b. Set SaveToCard option to "Yes" and press the Enter button. Wait till "Yes" reverts to "No".



5. Remove the SD card from the controller and inserting the SD card into the Laptop.
6. Verify 2 parameter files (Param.bin & Param.ucf) saved and their file sizes are larger than 100 KB.
7. If the param file sizes are less than 100 KB then repeat step 4.



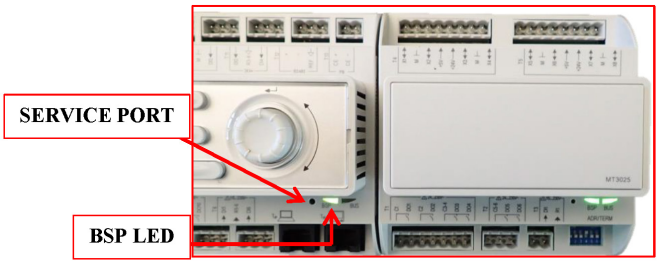
8. If the param files did not save then check the SD card lock or try a different SD card.



9. This completes saving parameters to the SD card.

Downloading Software to the Controller

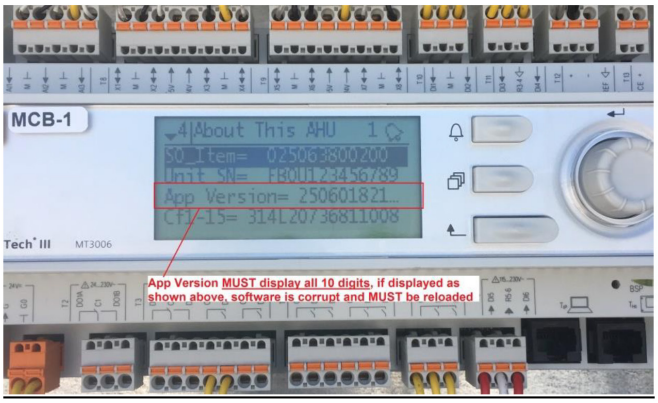
1. Enter the level 2 password.
2. From the Main Menu, set the Control Mode to Off.
3. Power the controller off and wait 90 seconds.
4. Make sure that all communication modules that need to be updated are connected.
5. Insert the end of a 3/64" Allen Key or other similar tool in the service port on the controller and hold the service button depressed. (The service button will "click" once depressed).



6. While holding the service button depressed, apply power to the controller.
7. Continue depressing the service button and observe the BSP LED begins to flash between red and green.
8. Release the service button after the flashing red/green sequence lasts for 3 or more cycles.
9. When the BSP LED's has stopped flashing between red and green check if the BSP LED is either OFF or amber.
    a. If OFF then repeat the download process again after 90 seconds off time.

NOTE: Updating from version 8.xx BSP to 10.xx BSP firmware will require repeating the download process twice. During some software downloads, the controller display may flash blue.

10. Cycle power to the controller after a solid amber BSP LED is present.
11. From the Main Menu scroll down to About this AHU and observe the APP version shows the same value as the zip file originally downloaded (2506017xxx or 8xxx).
12. If APP version appears as shown, you will need to repeat steps above until APP version displays ALL 10 digits completely.

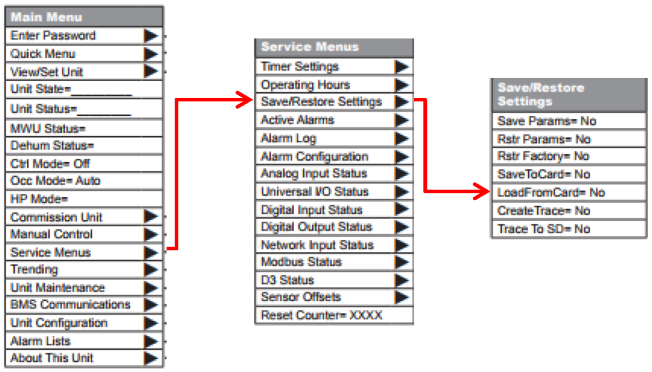


Restoring Parameters to the Controller

1. Make sure the SD memory card is still within the controller's memory card slot.
2. Enter the Level 2 Password.
3. From the Main Menu select Service Menus then Save/Restore Settings.
4. Set the LoadFromCard parameter to Yes, and press the enter button.
    a. The controller will reset twice but may perform up to three resets if a communication module is installed.

NOTE: On DPS units with ECM fans, the controller will ask to confirm RPM value per the site's air balance report or design selection. Select YES once the proper RPM is entered to have the controller automatically apply changes and reset again.

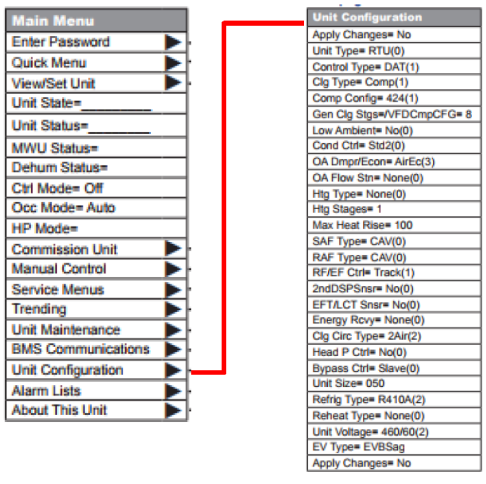
    b. Wait 10 seconds after the main menu appears before proceeding.



5. From the Main Menu scroll down to About this AHU and observe the APP version has no square bracket "…]"at the end. If a square bracket appears then the parameter restore process failed and needs to be repeated.
6. Once the restore process is complete, remove the SD memory card by momentarily pushing it in and releasing to retract.
7. This completes the parameter restore from SD card process.

Manually Programming the Unit Configuration

1. If a Save and Restore was not performed then setup the unit per the software configuration sticker installed on the unit door.
    a. Description of each configurator value is shown under the "Unit Configuration Menu" list below.
    b. OM 920 also contains the unit configuration menu.
2. Enter the Level 2 Password.
3. From the Main Menu select Unit Configuration.
4. Scroll through each option within the Unit Configuration menu, changing any parameters not matching the software configuration sticker on the door.



5. Once all the values under the Unit Configuration menu are confirmed, set the Apply Changes parameter to Yes and press the enter button.
6. The controller will perform an automatic reset.
7. If the controller did not reset then verify the APP version for an error as mentioned under the “Restore parameters to the controller” section, step 4.
8. This completes the manual programming process.
9. Proceed with setting up individual setting to commission the unit as required for the application.

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 28 configuration variables within the MCB. These variables define things such as the type of cooling, number of compressors and cooling stages and the type of heat. If all of these items are not set appropriately for the specific unit, the unit will not function properly. The correct settings for these parameters are defined for a given unit by the unit “Software Configuration Code.”

The “Software Configuration Code” consists of a 28-character string of numbers and letters. The code can be found on the Unit Software Identification Label located on the back side of the control panel door. The code should match the code found in the controller under the main menu/ About this AHU/CF1-15= (first fifteen numbers or letters)/CF2-16-30 (second set of fifteen numbers or letters). Table 3 on page 11 lists the configuration code variables including the position within the code, description of the parameter, and the applicable settings for each. The default values are shown in bold font. The unit is configured at the factory, however it may also be configured in the field by accessing the Unit Configuration Menu. Once changes have been made to the Unit Configuration Menu, the Apply Changes flag must be changed from no to yes in order for the controller to recognize the changes. Setting the Apply Changes flag to YES will automatically reset the controller.

Table 3: Unit Configuration

Configuration Code Position	Description	Values (Default in Bold)	Special Condition	RTU	MPS	DPS	DPS_H	SCU
1	Unit Type	**0=Applied Rooftop (RTU)** 1=Self-Contained (SCU) 2=Commercial Rooftop (MPS) 3=Rebel Cool Only (DPS/DAH) 4=Rebel Heat Pump (DPS_H)		•	•	•	•	•
2	Control Type	0=Zone Control **1=DAT Control** **2=1ZoneVAV**		•	•	•	•	•
3	Cooling Type	0 = None **1=Standard Compressorized Clg** 2=Chilled Water 3=F&BP 4=Variable Comp Circuit 1 5=Variable Comp Circuit 2 6=VRV 7=NA 8=NA 9=Digital Comp 1 Circuit 10=Digital Comp 2 Circuits		•	•	•	•	•
4	Compressorized Cooling Configuration	0=None 1=Generic Condenser 2=2Cmp/2Circ/3Stg 3=3Cmp/2Circ/4StgorVar (Var used for initial MPS026, 030&035 release) 4=2Cmp/2Circ/2or6StgorVar (6 stg if 7=2,3,4or5) 5=3Cmp/3Circ/3Stg_NoWRV 6=3Cmp/3Circ/3Stg_WRV 7=4Cmp/2Circ/4StgorVar 8=4Cmp/4Circ/4Stg_NoWRV 9=4Cmp/4Circ/4Stg_WRV A=6Cmp/2Circ/6StgorVar B=6Cmp/6Circ/6Stg_NoWRV C=6Cmp/6Circ/6Stg_WRV D=3Cmp/2Circ/5StgorVar E=4Cmp/2Circ/5or8StgorVar (Var used for initial MPS040) (8 stg if 7=2,3,4or5) F=8Cmp/4Circ/8Stg G=8Cmp/8Circ/8Stg H=6Cmp/3Circ/6Stg I=Not Used J=3 Cmp/3Circ/4Stg K=Spare L=1Var/1Circ M=Var/1STD/1Circ		•	•	•	•	•
5	Generic Condenser Stages	1 – 8 Stages (**default = 8**)/		•	• (if 4=4, 5or 6)	• (if 4=4, 5or 6)		
6	Low Ambient	**0 = No** 1 = Yes	This position currently has no effect on unit operation.					
7	Condenser Control	0=Std Method 1 1=Std Method 2 2=Evap ABB 3=Evap MD2 4=Evap MD3 5=Evap DF 6=Not Used 7=EBM 8=INV 9=INV w/MicroC OA Coil	•	•	•	•		

For questions about the procedure please contact the Technical Response team at: TechresponseAAH@daikinapplied.com or 844-521-3928

Configuration Code Position	Description	Values (Default in Bold)	Special Condition	RTU	MPS	DPS	DPS_H	SCU
8	Damper Type	0=None 1=Single Position 30% 2=Single Position 100% **3=Economizer Airside** 4=Economizer Waterside 5=100%OA_D3 6=AirEcon_D3 7=30%_D3 8=EconoAirsideFDD 9=EconFDDD3	Values 1, 2, 5 & 7 only apply if Position 1 = 0 (RTU), 2 (MPS), 3 or 4 (DPS) Value 4 only applies if Position 1 = 1 (SCU)	•	•	•	•	•
9	OA Flow Station	**0=None** 1=DF_015-030 (800) 2=DF_036-042 (802) 3=DF_045-075 (047) 4=DF_080-135 (077) 5=Generic Flow Station 6=Generic Flow Station w/CO2		•	•	•	•	•
10	Heating Type	**0=None** 1=F&BP Control 2=Staged 3=Modulated Gas, 3-1 4=Modulated Gas 20-1 5=Steam or Hot Water 6=SCR Electric 7=MPSLoGas 8=MPSHiGas		•	•	•	•	•
11	Max Heating Stages	1-8 Stages (**Default = 1**)		•	•	•	•	•
12, 13, 14	Max Heat Rise	Three Digits (**Default = 100**)		•	•	•	•	•
15	Supply Fan Type	**0=Constant Volume** 1=VFD/ABB_BD 2=VFD/DF_BD 3=VFD/MD2_BD 4=VFD/MD3_BD 5=VFD/MD6_BD 6=EBMVAV_DD 7=EBMCAV_DD 8=ABBVAV_DD 9=ABBCAV_DD		•	•	•	•	•
16	Return Fan Type	**0=CAV** 1=RF_EF VFD/ABB 2=RF_EF VFD/DF 3=RF_EF VFD/MD2 4=RF_EF VFD/MD3 5=RF_EF VFD/MD6 6=PrpEx VFD/ABB 7=PrpEx VFD/DF 8=PrpEx VFD/MD2 9=PrpEx VFD/MD3 A=PrpEx VFD/MD6 B=None C=1StageExh D=2StageExh E=3StageExh F=EBMVAV_DD G=EBMCAV_DD H=ABBVAV_DD I=Not Used J=ABBCAV_DD		•	•	•	•	
17	Return/Exhaust Fan Capacity Control Method	0=None **1=Tracking** 2=Building Pressure 3=Speed 4=OADamper		•	•	•	•	

For questions about the procedure please contact the Technical Response team at: TechresponseAAH@daikinapplied.com or 844-521-3928

Configuration Code Position	Description	Values (Default in Bold)	Special Condition	RTU	MPS	DPS	DPS_H	SCU
18	Second Duct Pressure Sensor	**0=No** 1= Yes		•				•
19	Entering Fan Temp Sensor	**0=No** 1=Yes		•	•	•	•	
20	Energy Recovery	**0=None** 1=ConstSpdWhl/NoRH 2=VarSpdWhl/Danfoss 3=VarSpdWhl/MD2 4=VarSpdWhl/MD3 5=VarSpdWhl/ABB 6=ConstSpdWhl/wRH		•	•	•	•	
21	Cooling Circuit Type	**0=Individual** 1=2,3 or 4 Circ. Water Condenser 2=2 Circ. Air Condenser	Values 0 and 1 are valid only when Position 1 = 1 (SCU)	•	•			•
22	Head Pressure Control	**0=No** 1=Yes	This position is valid only when Position 1 = 1 (SCU).					•
23	Bypass Valve Control	**0=Slave** 1=Bypass	This position is valid only when Position 1 = 1 (SCU).					•
24, 25, 26	Unit Size	Three digits (**default 050**)		•	•	•	•	•
27	Refrigerant Type	**0=R22** 1=R407C 2=R410A		•	•	•	•	•
28	Reheat Type	**0=None** 1=StgHG 2=ModHG 3=StdHtRht 4=ModLSC 5=ModHG&LSC		•	•	•	•	
29	Unit Voltage	0=208/60Hz 1=230/60Hz **2=460/60Hz** 3=575/60Hz 4=208/50Hz 5=230/50Hz 6=460/50Hz 7=575/50Hz		•	•	•	•	•
30	EVType	0=None 1=EVB_Sag 2=EVB_DF 3=MTIII_Sag 4=MTIII_DF 5=MTIII_Sag_DF 6=MTIII_DF_Sag 7=MTIII_DF_C				•	•	

For questions about the procedure please contact the Technical Response team at: TechresponseAAH@daikinapplied.com or 844-521-3928

Description of Operation

Temperature Sensors

The MicroTech unit controller uses passive negative temperature coefficient (NTC) 10K ohm sensors. These sensors vary their input resistance to the MCB as the temperature changes. Table 3 details the resistance versus temperature values. For typical sensor wiring examples refer to Figures 12, 13, and 14.

Table 4: Nominal Input Resistance versus Temperature

Temp (ºF)	R nominal (Ω)	Temp (ºF)	R nominal (Ω)	Temp (ºF)	R nominal (Ω)	Temp (ºF)	R nominal (Ω)	Temp (ºF)	R nominal (Ω)
-40	336.050	-6	103.486	28	36.601	62	14.546	96	6.382
-39	323.889	-5	100.184	29	35.565	63	14.179	97	6.238
-38	312.212	-4	96.999	30	34.562	64	13.822	98	6.097
-37	300.999	-3	93.927	31	33.591	65	13.475	99	5.960
-36	290.229	-2	90.962	32	32.650	66	13.139	100	5.826
-35	279.884	-1	88.101	33	31.739	67	12.811	101	5.696
-34	269.945	0	85.340	34	30.856	68	12.493	10).	5.569
-33	260.396	1	82.676	35	30.000	69	12.184	103	5.446
-32	251.218	2	80.103	36	29.171	70	11.884	104	5.325
-31	242.397	3	77.620	37	28.368	71	11.591	105	5.208
-30	233.918	4	75.222	38	27.590	72	11.307	106	5.093
-29	225.766	5	72.906	39	26.835	73	11.031	107	4.981
-28	217.928	6	70.670	40	26.104	74	10.762	108	4.872
-27	210.390	7	68.510	41	25.394	75	10.501	109	4.766
-26	203.139	8	66.424	42	24.707	76	10.247	110	4.663
-25	196.165	9	64.408	43	24.040	77	10.000	111	4.562
-24	189.455	10	62.460	44	23.394	78	9.760	112	4.463
-23	182.998	11	60.578	45	22.767	79	9.526	113	4.367
-22	176.785	12	58.759	46	22.159	80	9.298	114	4.273
-21	170.804	13	57.001	47	21.569	81	9.077	115	4.182
-20	165.048	14	55.301	48	20.997	82	8.862	116	4.093
-19	159.506	15	53.658	49	20.442	83	8.652	117	4.006
-18	154.169	16	52.069	50	19.903	84	8.448	118	3.921
-17	149.030	17	50.533	51	19.380	85	8.249	119	3.838
-16	144.081	18	49.047	52	18.873	86	8.056	120	3.757
-15	139.313	19	47.610	53	18.380	87	7.868	121	3.678
-14	134.720	20	46.220	54	17.902	88	7.685	122	3.601
-13	130.295	21	44.875	55	17.438	89	7.506	123	3.526
-12	126.031	22	43.574	56	16.988	90	7.333	124	3.453
-11	121.921	23	42.315	57	16.551	91	7.164	125	3.381
-10	117.960	24	41.097	58	16.126	92	6.999	126	3.311
-9	114.141	25	39.917	59	15.714	93	6.839	127	3.243
-8	110.460	26	38.776	60	15.313	94	6.682	128	3.176
-7	106.910	27	37.671	61	14.924	95	6.530	129	3.111

Pressure Sensors

The MicroTech unit controller uses 0 to 5” W.C. static pressure transducers for measuring duct static pressure. As the duct static pressure varies from 0-5” W.C., the transducer output will vary from 4-20mA.

If building static pressure control is provided, a -0.25” W.C. to 0.25” W.C. static pressure transducer is used. As the building static pressure varies from -0.25” W.C. to 0.25” W.C., the transducer output will vary from 4-20mA.

Troubleshooting Pressure Transducers

If the duct static pressure always reads 0” WC on the unit keypad/display and the Supply fan speed is continuously ramping to 100%, check the following:

If the unit has two duct static pressure sensors (SPS1 and SPS2), verify that they both function properly per the following procedure. Also check for faulty wiring connections at the VFD analog inputs, ECM motor or at the unit controller. The controller displays and controls to the lower of the two readings. If a sensor is defective and inputs 0 volts to the VFD, the static pressure reading on the keypad/display reads 0 and the controller attempts to increase the 0 value to set point by ramping the supply fan motor up. If a second sensor (SPS2) is not installed or the pressure tubing to it is not connected, make sure the 2nd DSP Sensor= parameter in the Unit Configuration menu of the keypad/display is set to “No” so that the controller ignores the second static pressure analog input. If a second sensor (SPS2) is installed, make sure the 2nd DSP Sensor= parameter in the Unit Configuration menu of the keypad/display is set to “Yes”.

Check the 24 VDC power supply to the sensor, verify that there is 24 VDC between the suspect transducer “+” terminal and case ground. Using an accurate manometer or gauge, measure the same pressure that the suspect transducer is sensing. To do this, tap into the transducer high and low pressure tubing or locate the measurement device taps next to the transducer taps. Measure the output from the transducer, if the measured output and pressure do not match, there may be a wiring issue, a connection problem, or the transducer may be defective. Some VFD’s use a 500ohm resistor to change the transducer signal from 4-20mA to 2-10VDC, the transducer signal at the VFD will then be 2-10VDC. The factory installed 500 ohm resistor (if applicable) is installed across “VIA” and “CC” terminals of the VFD.

NOTE: 3-wire transducers may have the resistor wired across the S and – terminals of the transducer. If the measured output and pressure match, the VFD parameters and/or Modbus communication between the controller and the VFD will need to be verified. Remove power from the controller. If available, swap a similar good transducer with the suspect transducer. Restore power and verify whether the suspect transducer is defective.

NOTE: If the suspect sensor is measuring duct static pressure, verify that the high and low pressure taps are properly installed. An improper pressure tap installation can cause severe fluctuations in the sensed pressure. Refer to the model-specific installation manual for pressure tap installation guidelines.

Duct Pressure Sensor

Input Voltage - 24 VDC

Output - 4-20 mA

NOTE: The transducer output signal is 4-20mA however the signal entering the VFD is converted to a DC voltage signal via a 500 Ohm resistor on the Daikin Applied MD drives.

Figure 8: Duct Pressure Sensor Output

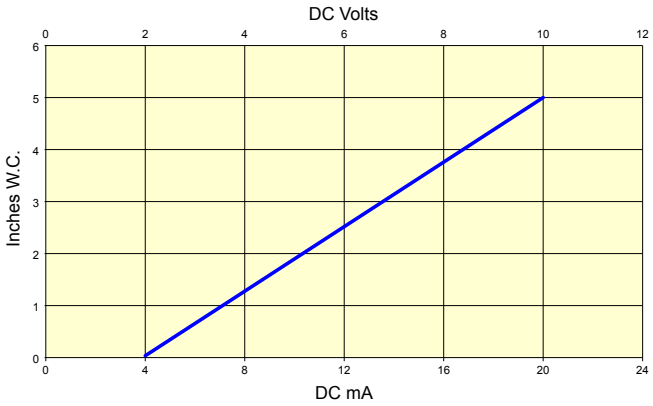
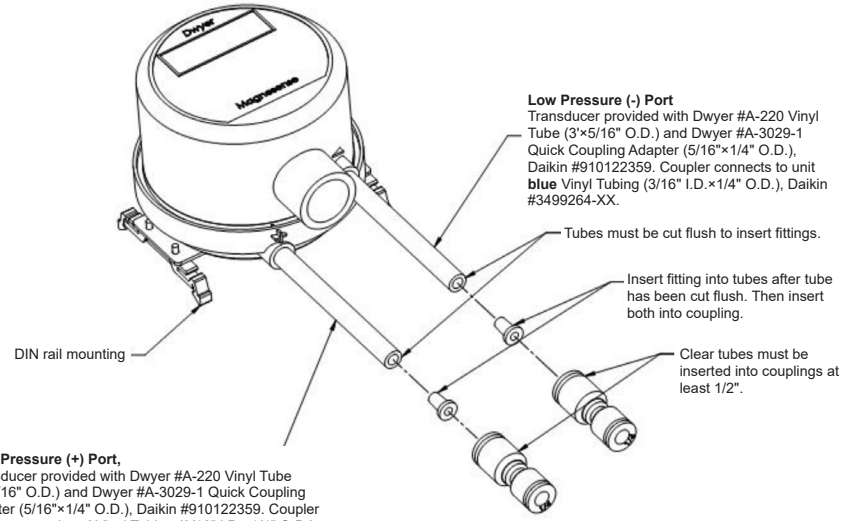


Figure 9: Duct Pressure Sensor

Digital display is not included.

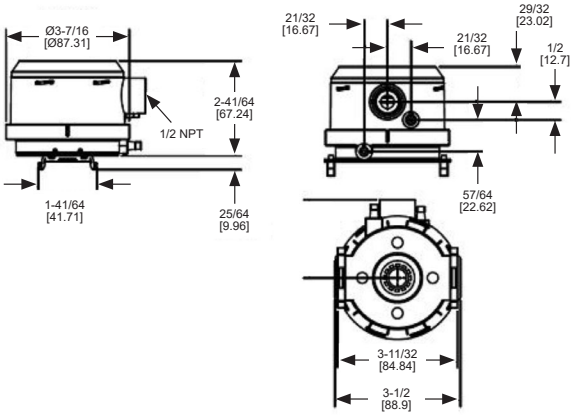
Order separately:
Daikin P/N #910117462
Dwyer P/N #A-441



Calibration: Factory set to 0.0" WC to +5.0" WC, where 4maDC is output at 0.0" WC and 20maDC is output at +5" WC.

Jumper configuration: PJ3 = M position. PJ5 = N position. PJ7 = H20 position. Filter calibration change PJ3 position to = F, Factory Set = 1. Return PJ3 to M position.

When required, use external loop resistor 499 OHMs, 1% Tol. Daikin #044690105.



Accuracy: 0" to 5" WC
Range Accuracy: ± 2%
Stability: ±1% F.S./year
Temperature Limits: 0°F to 150° (-18°C to 66°C)
Pressure Limits: 1 psi maximum, operation; 10 psi, burst
Power Requirements: 10 to 35 VDC (2-wire)
Output Signals: 4 to 20 mA (2-wire)
Response Time: Field-adjustable 0.5 to 15 seconds time constant. Provides a 95% response time of 1.5 to 45 seconds
Zero and Span Adjustments: Digital push button
Loop Resistance: Current output 0 to 1250 maximum
Current Consumption: 40 mA maximum
Display: 4 digit LCD (optional)
Electrical Connections: 4-20 mA, 2-wire; European-style terminal block for 16 to 26 AWG
Electrical Entry: 1/2" NPS thread; accessory – cable gland for 5 to 10 mm diameter cable
Process Connection: 3/16" (5 mm) I.D. tubing; maximum O.D. 9 mm
Enclosure Rating: NEMA 4X (IP66)
Mounting Orientation: Diaphram in VERTICAL POSITION ONLY
Weight: 8.0 oz. (230 g)
Agency Approvals: CE and UL

Building Pressure Sensor

Input Voltage - 24 VDC

Output - 4-20 mA

NOTE: The transducer output signal is 4-20mA however the signal entering the VFD is converted to a DC voltage signal via a 500 Ohm resistor on the Daikin Applied MD drives.

Figure 10: Building Pressure Sensor Output

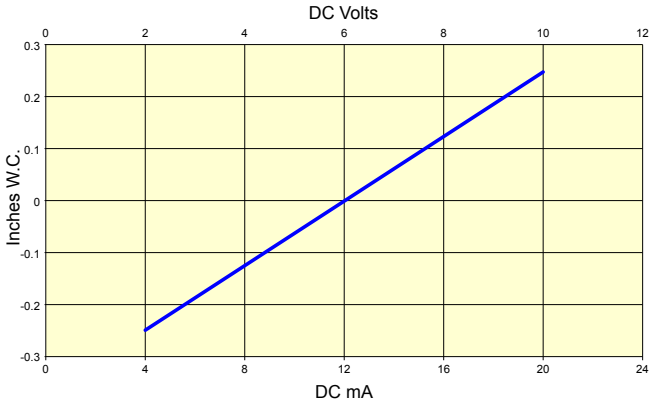


Figure 11: Building Pressure Sensor

Digital display is not included.

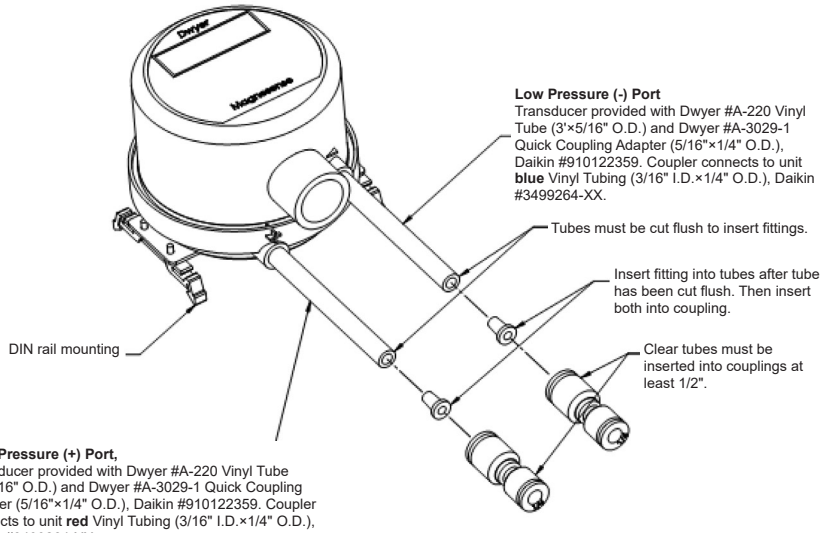
Order separately:
Daikin P/N #910117463
Dwyer P/N #A-441

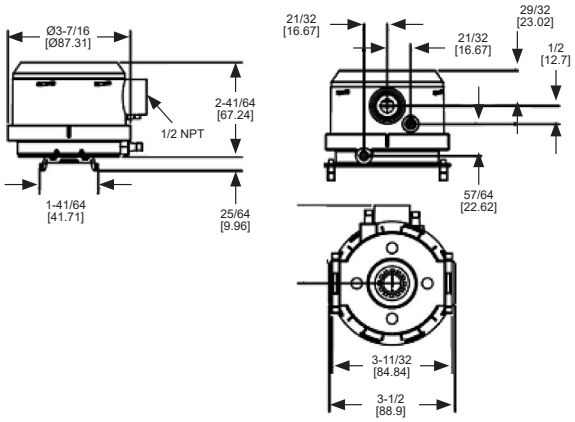
Calibration: Factory set to -0.25" WC to +0.25" WC, where 4ma is output at -0.25" WC and 20ma is output at +0.25" WC.

Jumper configuration: PJ3 = M position . PJ5 =ZC position.

When required, use external loop resistor 499 OHMs, 1% Tol. Daikin #044690105.

Accuracy: 0" to 5" WC
Range Accuracy: ± 2%
Stability: ±1% F.S./year
Temperature Limits: 0°F to 150° (-18°C to 66°C)
Pressure Limits: 1 psi maximum, operation; 10 psi, burst
Power Requirements: 10 to 35 VDC (2-wire)
Output Signals: 4 to 20 mA (2-wire)
Response Time: Field-adjustable 0.5 to 15 seconds time constant. Provides a 95% response time of 1.5 to 45 seconds
Zero and Span Adjustments: Digital push button
Loop Resistance: Current output 0 to 1250 maximum
Current Consumption: 40 mA maximum
Display: 4 digit LCD (optional)
Electrical Connections: 4-20 mA, 2-wire; European-style terminal block for 16 to 26 AWG
Electrical Entry: 1/2" NPS thread; accessory – cable gland for 5 to 10 mm diameter cable
Process Connection: 3/16" (5 mm) I.D. tubing; maximum O.D. 9 mm
Enclosure Rating: NEMA 4X (IP66)
Mounting Orientation: Diaphram in VERTICAL POSITION ONLY
Weight: 8.0 oz. (230 g)
Agency Approvals: CE and UL





Mamac Panel-Mounted Pressure Transducer

⚠ WARNING

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

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

The following describes the proper wiring of these pressure transducers with mA output.

1. Remove the terminal block by carefully pulling it off the circuit board.
2. Locate the [+] and [-] terminal markings on the board.
3. Attach the supply voltage to the [+] lead.
4. Connect the 4-mA output ([-] terminal) to the controller's input terminal.
5. Ensure that the power supply common is attached to the common bus of the controller.
6. Re-insert the terminal block to the circuit board and apply power to the unit.
7. Check for the appropriate output signal using a DVM set on DC milliamps connected in series with the [-] terminal.

Specifications

Accuracy: ± 1% FS

Overpressure: 10 PSID

Supply Voltage: 12–40 VDC
12–35 VAC (VDC output units only)

Supply Current: VDC units — 10mA max.
mA units — 20 mA max.

Enclosure: 18 Ga. C R Steel NEMA 4 (P-65) or panel-mount chassis

Finish: Baked-on enamel PMS2GR88B

Compensated Temp Control: 25°F – 175°F (-18°C – -80°C)

T.C. Error: ± 0.0125%/°F (± 0.02%/°C)

Operating Temp Range: 0°F – 175°F (-18°C – 80°C)

Media Compatibility: Clean dry air or any inert gas

Environmental: 10 – 90% RH Non-condensing

Wire Size: 12 Ga. max.

Load Impedance: 1.6K ohms max. at 40VDC (mA output units)
1K ohms min. VDC output units)

Weight: Enclosure — 1.0 lbs. (45 kg)
Panel-mount — 0.5 lbs. (25 kg)

On model PR-274/275 the Range configuration switches must be set in the appropriate manner for correct readout on the main control. S1, S2, & S3 are selectable for uni-directional, bi-directional range selection and the output is selectable for VDC or 4-20 mA (2 wire) output.

Figure 12: Mamac Panel-Mounted Pressure Transducer Dimensions

LOW PRESSURE TRANSDUCER

For Additional Information See PR-274/275 Data Sheet

SPECIFICATIONS

Accuracy*: ±1% FS

Overpressure: 10 PSID

Supply Voltage: 12-40 VDC
12-35 VAC (VDC output units only)

Supply Current: VDC Units - 10 mA max.
mA Units - 20 mA max.

Enclosure: 18 Ga C. R. Steel NEMA 4 (IP-65) or Panel Mount Chassis

Finish: Baked on enamel-PMS2GR88B

Compensated Temp Range: 25°F-150°F (-4°C-65°C)

T. C. Error: ±0.0125%/°F (.02%/°C)

Operating Temp Range: 0°F-175°F (-18°C-80°C)

Media Compatibility: Clean dry air or any inert gas

Environmental: 10-90%RH Non-Condensing

Termination: Unpluggable screw terminal block

Wire Size: 12 Ga max.

Load Impedance: 1.6K ohms max. at 40 VDC (mA output units)
1K ohms min. (VDC output units)

Weight: **Enclosure -** 1.0 lbs. (.45 kg)
Panel Mount - 0.5 lbs. (.25 kg)

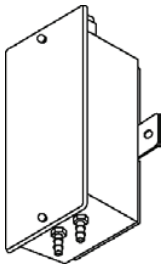
**Includes non-linearity, hysteresis and non-repeatability*

ORDERING INFORMATION

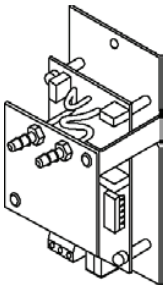
PACKAGING	RANGE		OUTPUT	
274 (enclosure)	**R1** ("wc)	0 TO 0.10 / -0.05 TO +0.05	**mA**	(4-20 mA 2-wire)
275 (panel mount)	**R2** ("wc)	0 TO 1.0 / 0 TO 0.5 / 0 TO 0.25 / -0.5 TO +0.5 / -0.25 TO +0.25 / -0.125 TO +0.125	**VDC**	(0-5 VDC or 0-10 VDC field selectable)
	R3 ("wc)	0 TO 5.0 / 0 TO 2.5 / 0 TO 1.25 / -2.5 TO +2.5 / -1.25 TO +1.25 / -0.625 TO +0.625		
	R4 ("wc)	0 TO 30 / 0 TO 15 / 0 TO 7.5 / -15.0 TO +15.0 / -7.5 TO +7.5 / -3.75 TO + 3.75		
	R5 (pa)	0 TO 25 / -12.5 TO +12.5		
	R6 (pa)	0 TO 250 / 0 TO 125 / 0 TO 62.5 / -125 TO +125 / -62.5 TO +62.5 / -31.25 TO +31.25		
	R7 (pa)	0 TO 1250 / 0 TO 625 / 0 TO 312.5 / -625 TO +625 / -312.5 TO +312.5 / -156.25 TO +156.25		
	R8 (pa)	0 TO 7500 / 0 TO 3750 / 0 TO 1875 / -3750 TO +3750 / -1875 TO +1875 / -937.5 TO +937.5		

INSTALLATION

Inspection - Inspect the package for damage. If damaged, notify the appropriate carrier immediately. If undamaged, open the package and inspect the device for obvious damage. Return damaged products.



Enclosure Mount Transducer



Panel Mount Transducer

Requirements

- Tools (not provided)
  - Digital Volt-ohm Meter (DVM)
  - Appropriate screwdriver for mounting screws
  - Appropriate drill and drill bit for mounting screws
- Appropriate accessories
- Two #8 self-tapping mounting screws (*not provided*)
- Training: **Installer must be a qualified, experienced technician**

Warning:

- Disconnect power supply before installation to prevent electrical shock and equipment damage.
- Make all connections in accordance with the job wiring diagram and in accordance with national and local electrical codes. Use copper conductors only.

Caution:

- Use electrostatic discharge precautions (e.g., use of wrist straps) during installation and wiring to prevent equipment damage.
- Avoid locations where severe shock or vibration, excessive moisture or corrosive fumes are present. NEMA Type 4 housings are intended for outdoor use primarily to provide a degree of protection against wind-blown dust, rain, and hose-directed water.
- Do not exceed ratings of the device.

Caution:

- Condensate or moisture must not enter pressure sensor ports

Mounting

The PR-274/275 must be mounted as indicated by the arrows on the enclosure. Refer to **Figure 7** for mounting dimensions.

1. Remove the transducer cover using a Phillips head screwdriver.
2. Select the mounting location.
3. Mount transducer on a vertical surface with two #8 self-tapping screws (not provided).
4. Transducer must be mounted above the pressure pick-up or a J-Loop must be incorporated in the tubing to function as a condensate trap.
5. Pull wires through bottom of enclosure and make necessary connections.
6. Replace cover and make pneumatic connections.

Wiring

Use maximum 12 AWG wire for wiring terminals. Use flexible 1/4" O.D. 5/32" I.D. tubing for the high and low pressure connections. Refer to **Figures 1, 2, 3**, & **4** for wiring information and **Figures 5** & **6** for switch designations.

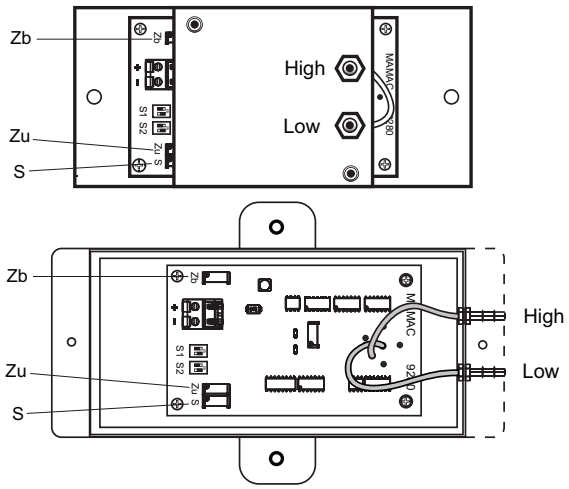
(Wiring Instructions continued on pages 2 and 3.)

Figure 12 continued: Mamac Panel-Mounted Pressure Transducer Dimensions

LOW PRESSURE TRANSDUCER

Wiring PR-274/275 Units with mA Output

PR-274/275 Low Pressure Transducer with mA Output



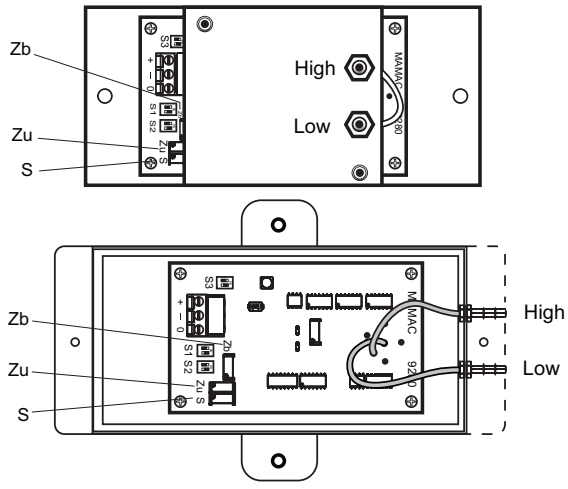
PR-274/275 pressure transducers with 4-20 mA output are powered with a 12-40 VDC supply.

The following describes the proper wiring of these pressure transducers with mA output:

1. Remove the terminal block by carefully pulling it off the circuit board.
2. Locate the [+] and [-] terminal markings on the board.
3. Attach the supply voltage to the [+] lead.
4. Connect the 4-20 mA output ([-] terminal) to the controller's input terminal.
5. Ensure that the power supply common is attached to the common bus of the controller.
6. Re-insert the terminal block to the circuit board and apply power to the unit.
7. Check for the appropriate output signal using a DVM set on DC milliamps connected in series with the [-] terminal.

Wiring PR-274/275 Units with VDC Output

PR-274/275 Low Pressure Transducer with VDC Output



PR-274/275 pressure transducers with VDC output are field selectable 0-5 VDC or 0-10 VDC output and can be powered with either a 12-40 VDC or 12-35 VAC.

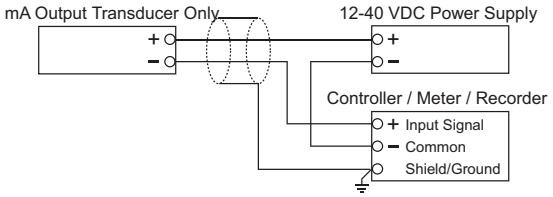
The following describes the proper wiring of these pressure transducers with VDC output:

1. Remove the terminal block by carefully pulling it off the circuit board.
2. Locate the [+], [-] and [O] terminal markings on the board.
3. Attach the power wires to the [+] and [-] terminals. The [-] terminal is also the negative terminal.
4. Connect the [O] terminal, which is the positive VDC output terminal, to the controller's input terminal.
5. Re-insert the terminal block to the circuit board and apply power to the unit.
6. Check the appropriate VDC output using a voltmeter set on DC volts across the [O] and [-] terminals.

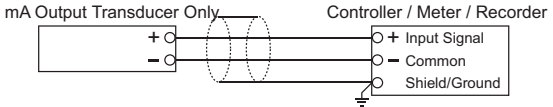
TYPICAL APPLICATIONS (wiring diagrams)

Figures illustrate typical wiring diagrams for the mA output low pressure transducer

Wiring for mA Low Pressure Transducers with an External DC Power Supply



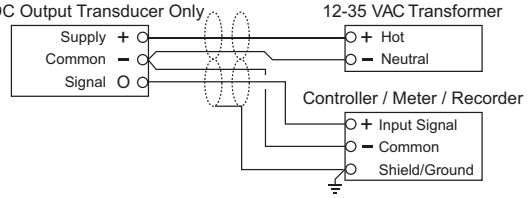
Wiring for mA Output Transducers where the Controller or Meter has an Internal DC Power Supply



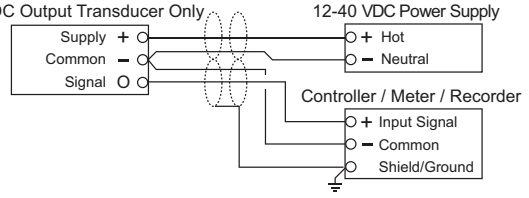
TYPICAL APPLICATIONS (wiring diagrams)

Figures illustrate typical wiring diagrams for the VDC output low pressure transducer

Wiring for VDC Low Pressure Transducers When Applied with External AC Supply



Wiring for VDC Low Pressure Transducers When Applied with External DC Supply

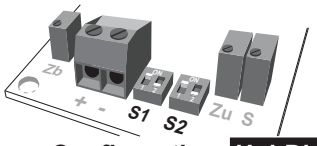


Caution: If you are using grounded AC, the hot wire must be on the [+] terminal. Also, if you are using a controller without built-in isolation, use an isolation transformer to supply the PR-274/275.
Caution: This product contains a half-wave rectifier power supply and must not be powered off transformers used to power other devices utilizing non-isolated full-wave rectifier power supplies.
Caution: When multiple PR-274/275 units are powered from the same transformer, damage will result unless all 24G power leads are connected to the same power lead on all devices. It is mandatory that correct phasing be maintained when powering more than one device from a single transducer.

Figure 12 continued: Mamac Panel-Mounted Pressure Transducer Dimensions

LOW PRESSURE TRANSDUCER

Switch Selections for Low Pressure Transducers with mA Outputs



mA Output

Range Configuration: Uni-Directional **Switch 1 (S1)**

		Factory Sealed
R1/R5	0 - 0.10 "wc / 25 pa	
R2/R6	0 - 1.0 "wc / 250 pa (default)	
	0 - 0.5 "wc / 125 pa	
	0 - 0.25 "wc / 62.5 pa	
R3/R7	0 - 5.0 "wc / 1250 pa (default)	
	0 - 2.5 "wc / 625 pa	
	0 - 1.25 "wc / 312.5 pa	
R4/R8	0 - 30.0 "wc / 7500 pa (default)	
	0 - 15.0 "wc / 3750 pa	
	0 - 7.5 "wc / 1875 pa	

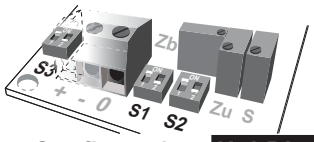
Range Configuration: Bi-Directional **Switch 1 (S1)**

		Factory Sealed
R1/R5	+/- 0.05 "wc / 12.5 pa	
R2/R6	+/- 0.5 "wc / 125 pa (default)	
	+/- 0.25 "wc / 62.5 pa	
	+/- 0.125 "wc / 31.25 pa	
R3/R7	+/- 2.5 "wc / 625 pa (default)	
	+/- 1.25 "wc / 312.5 pa	
	+/- .625 "wc / 156.25 pa	
R4/R8	+/- 15.0 "wc / 3750 pa (default)	
	+/- 7.5 "wc / 1875 pa	
	+/- 3.75 "wc / 937.5 pa	

Output Configuration: **Switch 2 (S2)**

Uni-directional (default)	
Bi-directional	

Switch Selections for Low Pressure Transducers with VDC Outputs



VDC Output

Range Configuration: Uni-Directional **Switch 1 (S1)**

		Factory Sealed
R1/R5	0 - 0.10 "wc / 25 pa	
R2/R6	0 - 1.0 "wc / 250 pa (default)	
	0 - 0.5 "wc / 125 pa	
	0 - 0.25 "wc / 62.5 pa	
R3/R7	0 - 5.0 "wc / 1250 pa (default)	
	0 - 2.5 "wc / 625 pa	
	0 - 1.25 "wc / 312.5 pa	
R4/R8	0 - 30.0 "wc / 7500 pa (default)	
	0 - 15.0 "wc / 3750 pa	
	0 - 7.5 "wc / 1875 pa	

Range Configuration: Bi-Directional **Switch 1 (S1)**

		Factory Sealed
R1/R5	+/- 0.05 "wc / 12.5 pa	
R2/R6	+/- 0.5 "wc / 125 pa (default)	
	+/- 0.25 "wc / 62.5 pa	
	+/- 0.125 "wc / 31.25 pa	
R3/R7	+/- 2.5 "wc / 625 pa (default)	
	+/- 1.25 "wc / 312.5 pa	
	+/- .625 "wc / 156.25 pa	
R4/R8	+/- 15.0 "wc / 3750 pa (default)	
	+/- 7.5 "wc / 1875 pa	
	+/- 3.75 "wc / 937.5 pa	

Output Configuration: **Switch 2 (S2)**

Uni-directional (default)	
Bi-directional	

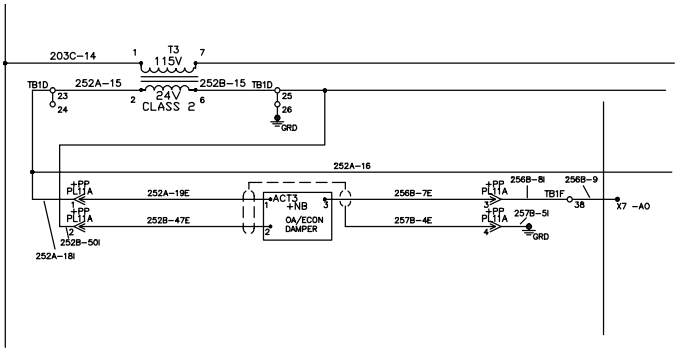
Output Configuration: **Switch 3 (S3)**

0 - 10 (default)	
0 - 5 VDC	

Actuators

The actuators are controlled by an analog signal from the unit controller. Damper actuators utilize a 0-10VDC analog signal while modulating heating/cooling valve actuators utilize a 2-10VDC signal. Spring-return actuators are used for the 0 - 30% outdoor air and economizer dampers. The mixing dampers are normally closed to the outside air.

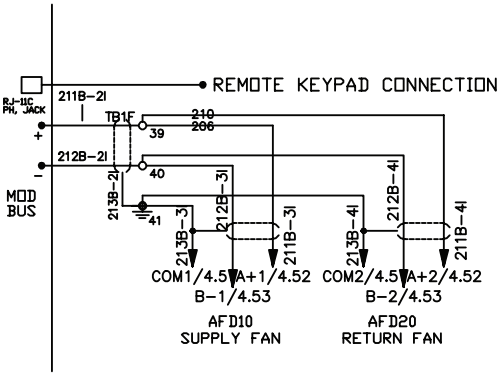
Figure 13: Actuator Wiring Diagram



Variable Frequency Drives (VFD's)

When controlling speed commands of supply, return or exhaust fans, energy recovery wheels or condenser fan variable frequency drives, the MicroTech unit controller uses an internal ModBus communications channel for control and monitoring of the Variable Frequency Drives . When confronted with ModBuss issues remember polarity is primary. Check the HMI menu under "Service Menus/ModBus status" all the fans should read "OK".

Figure 14: VFD Wiring Diagram

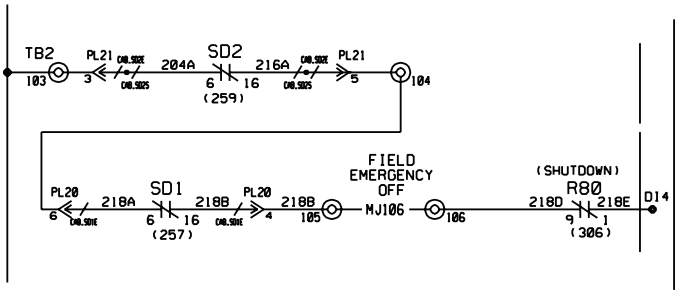


Smoke Detectors

Field installed as well as factory installed smoke detectors in the supply and return duct work should be wired into the circuit that feeds 24VAC to Digital input 4. While the circuit is complete and power is routed to DI4 gives the controller an "all clear" signal and normal operation is available. If the circuit is opened by one of the smoke detectors dry set of contacts and the 24 VAC is dropped from DI4 the controller initiates an "emergency shut down" The shutdown must be manually cleared once the contacts have closed again. To change to automatic re-start see the Alarm Configuration menu, and change the default from "Man Clr" to "Auto re-start" For connection points please refer to the electrical drawings that came with the unit.

NOTE: Figure 15 is a typical wiring scheme for smoke detector wiring; exact terminal numbers should be verified with the electrical diagram that was supplied with the unit.

Figure 15: Smoke Detector Wiring Diagram



ECM (Electronically Commutated Motor) Fan/Motor

The Rebel unit is equipped with a direct drive, ECM (Electronically Commutated Motor) fan/motor combination with a built in inverter. When equipped, the exhaust fan will be the same. The Maverick II unit also has this as an exhaust fan option. The MicroTech unit controller uses an internal Modbus communications channel for control and monitoring of the ECM fan/motor.

Addressing ECM Motors Procedure

⚠ CAUTION

Follow all Lock-Out Tag-Out procedures to minimize risks of injury to yourself and/or equipment during this procedure. Always wear appropriate levels of PPE governed by the hazards which are present. Terminals may vary always check unit specific wiring diagrams.

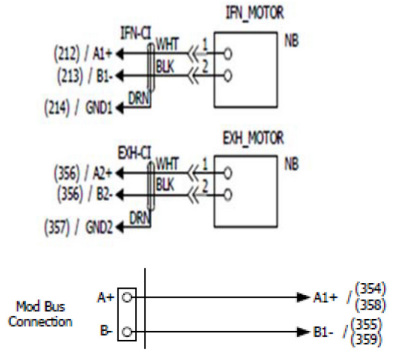
Use this procedure to address EMC motors. ECM – Electronically Commutated Motor communicates via Modbus RS485 twisted pair cables to the MicroTech unit controller. MicroTech can address the ECM for a supply, return-exhaust fan, outdoor fan or energy recovery wheel operation based on a unique Modbus address. A replacement ECM is shipped out from the warehouse with an address of "1" which is a direct replacement for a supply fan and does not require additional setup. If the ECM is used as a return-exhaust fan, outdoor fan or energy recovery wheel, it will need to be set up with one of the following address:

- 2 for RF/EF - return/exhaust fan
- 3 for ER - energy recovery motor
- 4 for OA fan - first outdoor/condenser fan motor
- 5 for OA fan - second outdoor/condenser fan motor

Addressing ECM Motors

1. Turn the supply power feed to all ECM fans and VFDs OFF, EXCEPT for the ECM motor to address. Supply power is turned off by switching the MMP and circuit breakers to the OFF position or pulling the fuses out.
2. Verify RS485 output (A+) on the MicroTech controller connects to (RSA) at the ECM and (B-) connects to (RSB) at ECM
3. Make sure the shield for the twisted pair cable is terminated at TB terminal 41 only.

Figure 16: Modbus and Fan Motor Wiring Diagrams

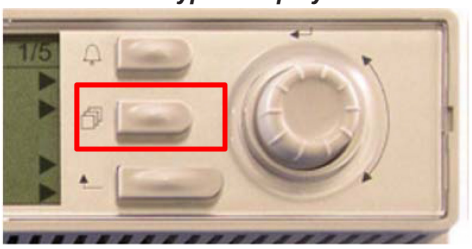


4. At the MicroTech controller, enter a level 2 password of 6363 and click on "About This AHU" to verify the code version is at least 310 for RTU MPS SCU and at least 204 for DPS. If older codes are installed, then contact the Daikin Applied Technical Response Center (TRC) to get the latest software for your unit before continuing.

Figure 17: About This AHU Screen Example

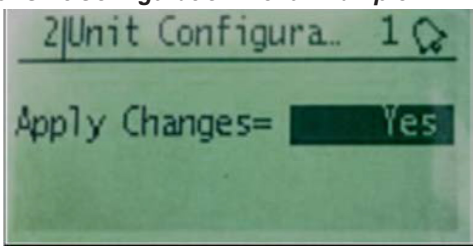
5. Press the middle rectangular button to go back to the Main Menu, as shown in Figure 18.

Figure 18: MicroTech Keypad/Display



6. Scroll down to "Control Mode" and set it to "OFF".
7. Scroll down and click on the "Unit Configuration Menu".
8. Scroll to the "SAF type" and set it to EBM VAV.
9. Scroll to the "RAF type" and set it to EBM VAV.
10. Scroll up to "Apply Changes" and set it to Yes as shown in Figure 19. Wait for the controller to restart.

Figure 19: Unit Configuration Menu Example

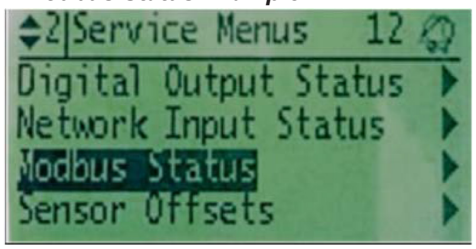


11. Enter the level 2 password again and go into “Service Menus” as shown in Figure 20.

Figure 20: Service Menus Example

12. Click on the “Modbus Status” menu as shown in Figure 21.

Figure 21: Modbus Status Example

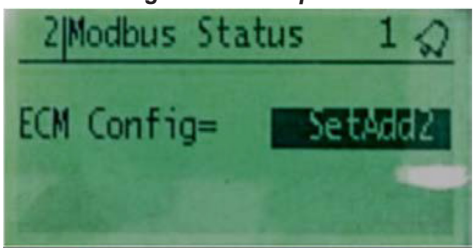


13. With the ECM motor wired correctly and communicating, the SF MB status will show “OK”. All other MB statuses will show “Fault”. If SAF, RF/EF,OF,ER statuses show “Fault”, then verify wiring connections and 3-phase power only on the ECM being addressed.

Figure 22: Modbus Statuses Example

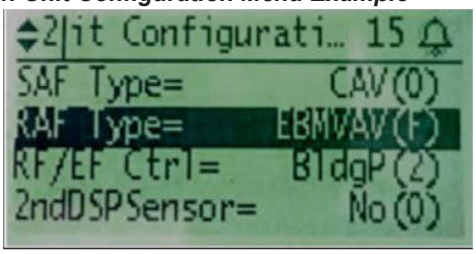
14. Click on the “ECM Config” menu
    - SF MB Status = Supply Fan Modbus
    - RF MB Status = Return Fan Modbus
    - ER MB Status = Energy Recovery Modbus
    - OF MB Status = Outdoor Fan Modbus
15. Set “ECM Config” to the following:
    - SetAdd1 for SAF Fan
    - SetAdd2 for RF/EF Fan
    - SetAdd3 for Energy Recovery Wheel
    - SetAdd4 for first Outdoor/Condenser Fan
    - SetAdd5 for second Outdoor/Condenser Fan
    - SetAICtl for 0-10VDC Analog Control

Figure 23: ECM Config Menu Example



16. The controller will revert back to the “ECM Config” menu, but now the SF MB Status will show fault while the RF/EF, OF, or ER MB Status will show OK.
17. Click on the middle rectangular button to go back to the main menu, as shown in Figure 18.
18. Click on the “Unit Configuration” menu and set the SAF,RF/EF type back to the original setting, as shown in Figure 24.

Figure 24: Unit Configuration Menu Example



19. Scroll up and set “Apply Changes” to yes.
20. Reset MMPs or replace fuses for all components turned OFF in Step 1. Modbus status for all components should now say “OK”.

Controller Inputs/Outputs

Table 5: RTU/MPS/DPS/DPH Main Control Board I/O

I/O							Config. Code Condition
PolyCool 600 Main Controller — RTU & MPS & DPS							Pos.1≠1
Analog Inputs — NTC							
#					**Point**	**Comments**	**Config. Code Condition**
AI 1					Discharge Temperature	10K Thermistor (STD)	All & MTIII MCB
AI 2					Return Temperature	10K Thermistor (STD)	8 <>2or5 OR 8=2or5 and 20>0 & MTIII MCB
AI 3					Outdoor Temperature	10K Thermistor (STD)	All & MTIII MCB
Universal Inputs/Outputs							
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**	**Config. Code Condition**
X 1		X			CO2 /Min OA/OA CFM	0-10VDC or 4-20 mA	8≠0 & 8≠4
X 2		X			Low Pressure 1 and 21	1K & 1.5K Ohm Input	3=1 & 4>1 & 4<H
X 2				X	Chilled Wtr	2-10 VDC	[3=2 or 3=3] & 1≠3 or 4
X 2		X			Ent Fan & Lvg Coil T	10K Thermistor	1=3 or 4 & 19=1
X 3		X			Space Temperature	10K Thermistor (STD)	All
X 4		X			Zone Setpoint	5 – 15 kOhm	All
X 4		X			DAT Reset	0-10VDC/4-20mA	2=1or2
X 5		X			Enthalpy&Freeze Sw²	1K & 1.5K Ohm Input	[1=0 or 2] & [(8=3,6,8 o r9) or (3=2, 3=3) or (10=1) or (10=5)]
X 5		X			Relative Humidity	0-10 VDC or 4-20 mA	1=3 or 4
X 6		X			Ent Fan & Lvg Coil T	10K Thermistor (STD)– Gas or Electric Heat & Dehum	1=0 & 19=1
X 6		X			Duct Static Pressure	4-20mA	1=2, 3 or 4 & 15=1-6, 8, A, C or E
X 7				X	OA Damper	0-10 VDC RPS, 0-10 VDC MPS	8=1, 2, 3, 5, 6,7,8 or 9
X 8		X			Building Static Pressure	4-20mA	1=2, 3, 4 & 16=6,7,8,9,A, F, H, K, or P
X 8	X				OAD End Switch Input	Dry Contact	1=0 & 8=8 or 9
X 9		X			Discharge Temperature	10K Thermistor (STD)	All & 4MT4 MCB
X 10		X			Return Temperature	10K Thermistor (STD)	8 <>2 or 5 OR 8=2 or 5 and 20>0 & 4MT4 MCB
X 11		X			Outdoor Temperature	10K Thermistor (STD)	All & 4MT4 MCB
Digital Inputs — Dry Contacts							
#					**Point**	**Comments**	**Config. Code Condition**
DI 1					Air Flow Switch / DHL (R63)	Dry Contact	All
DI 2					Filter Switch	Dry Contact	All
Digital Inputs — 24V							
#					**Point**	**Comments**	**Config. Code Condition**
DI 3					Remote START / STOP	External 24V	All
DI 4					Emergency OFF / DHL (R63)	External 24 V	All
Digital Inputs — 115V							
#					**Point**	**Comments**	**Config. Code Condition**
DI 5					High Pressure 1	115 VAC Input	3 = 1 & 4 > 1 & 4 < H
DI 5					High Pressure 1	115 VAC Input	1=3 or 4 & 3=4
DI 6					High Pressure 2	115 VAC Input	3 = 1 & 4 > 1 & 4 < H
DI 6					Enthalpy Switch	115 VAC Input	1 = 3 or 4 & 8 = 3, 6, 8 or 9
Digital Outputs — Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					**Point**	**Comments**	**Config. Code Condition**
DO 1					Compressor 1/GC Stg 1		3=1 Or [1=0 or 2 & 3=5 & 4=4, 7, D]
DO 1					INV Comp On/Off	Currently not physically wired in unit	1=3or4&3=4&4=LorM&24,25,26=003-015, 016, 018, 020, 025 or 028
DO 1					Variable Comp 1 On/Off		1=2&3=4
DO 2					Compressor 3/GC Stg 2		[3=1 & any of the following:4=7, 9,A, D,EOR4=3 & 1=2OR4=3 & & 1=0 & 27=0or1OR4=1 & 5>1] Or[1=0&3=5&4=7, D]OR[1=2&3=4or5]
DO 2					STD3 Compressor		3=4 & 4=M
DO 2					Unld 2 Comp 1		4=4 and 7=2,3,4 or5
DO 3					Compressor 2/GC Stg 3		[3=1 & any of the following:4>1 & 4<FOR4=1 and 5>2]Or[1=2&3=4]
DO 3					Heat Stage 1		1=3or4 & 10=2
DO 3					Gas Heat (On/Off)		1=3or410=7or8
DO 3					SCR Enable 1		1=3or4&10=6

DO 3	VFD Comp 2 On/Off		[1=0&3=5]Or[1=2&3=5]
DO 4	Compressor 4/GC Stg 4		3=1 & any of the following:4=7, A, EOR 4=1 & 5>3OR1=0 & 4=3 & 27=2
DO 4	Unld 2 Comp 2		1=0&4=4 and 7=2,3,4or5
DO 4	Heat Stage 2		1=3or4 & 10=2 & 11>1
DO 4	Comp 4		[1=2&3=4 & 4=7]OR[1=0&3=5&4=7orJ& 24, 25, 26>074]
DO 5	Supply Fan		All
DO 6	Cond Fan Output C		1 = 0 & 3=1 & 4>1 & 24, 25, 26=(060-105) & (27=0 or 27=1) & (7≠2,3,4or5)
DO6	HGBP Valve		1=2&3=1&28=2
DO6	HGRH Bleed Valve		1=2&3= 4or5&28=2
DO6	Constant Speed Enthalpy Wheel	Energy Recovery	20=1or6&30=3,4,5,6
DO 7	Cond Fan Output A	2 Relays, CF3 & CF4	[1=0or2&3=1 & 4>1& 4<F]OR[1=2&3=4]
DO 7	Generic Comp Stg 7		3=1 & 4=1 & 5>6
DO 7	Heat Stage 3		1=3or4 & 10=2 & 11>2
DO 8	Cond Fan Output B	2 Relays, CF5 & CF6	[1 = 0 & 3=1 & 4>1 & 4<D & 24, 25, 26=(075-105) & (27=0 or 27=1)]OR[1=0 & 3=1 & 4>1 & 4<D & 24, 25, 26=(075 or 090-140) & 27=2]OR[1=2 & 3=1 & 24,25,26=030,035,040or050]OR[1=2 & 3=4]Note: If 7=2,3,4or5 then this applies only if 24,25,26 is greater than 110.
DO 8	Generic Comp Stg 8		3=1 & 4=1 & 5>7
DO 8	Heat Stage 4		1=3or4 & 10=2 & 11>3
Digital Outputs — Solid State Relays, 24-230 VAC, 0.5 A			
#	**Point**	**Comments**	**Config. Code Condition**
DO 9	Alarm		All
DO 10	Fan Operation		All

1. When used for LP1 and LP2, LP1 is considered Closed when resistance value is 0-799 or 1250-1800. Otherwise LP1 is considered Open. LP2 is considered Closed when the resistance value is 0-1249, otherwise LP2 is considered Open.
2. Enthalpy switch is considered Closed when resistance value is 0-799 or 1250-1800. Otherwise it is considered Open. Freezestat is considered Closed when the resistance value is 0-1249, otherwise it is considered Open.

Table 6: SCU Main Control Board I/O

I/O							**Config. Code Condition**
PolyCool 600 Main Controller – SCU							Pos. 1=1
Analog Inputs – 10K NTC							
#					**Point**	**Comments**	**Config. Code Condition**
AI 1					Discharge Temperature	10K Thermistor (STD)	All
AI 2					Return Temperature	10K Thermistor (STD)	All
AI 3					Outdoor Temperature	10K Thermistor (STD)	All
Universal Inputs/Outputs							
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**	**Config. Code Condition**
X 1		X			Entering WaterTemperature	10K Thermistor (STD)	3=1 & 4>1
X 2		X			Low Pressure 1 and 21	1K & 1.5K Ohm Input	3=1 & 4>1
X 2				X	Chilled Wtr	2-10 VDC	3=2 or 3=3
X 3		X			Space Temperature	10K Thermistor (STD)	All
X 4		X			Zone Setpoint	5 – 15 kOhm	2=0
X 4		X			DAT Reset	0-10VDC/4-20mA	2=1
X 5		X			Enthalpy&Freeze Sw2	1K & 1.5K Ohm Input	Enth: 8=3 Frz: 3=2, 3=3, 8=4, 10=1, 10=5
X 6				X	Bypass Valve	2 – 10 VDC	3=1
X 6				X	Water Regulating Valve	2 – 10 VDC	3=1 & 8<>4 & 22=1
X 7				X	Economizer	0 – 10 VDC (Air Econo)/2-10 VDC (Water Econo)	8=3 or 8=4
X 8		X			Mixed Air Temp	10K Thermistor (STD)	All
Digital Inputs – Dry Contacts							
#					**Point**	**Comments**	
DI 1					Air Flow Switch	Dry Contact	All
DI 2					Filter Switch	Dry Contact	All
Digital Inputs – 24V							
#					**Point**	**Comments**	
DI 3					Remote Start / Stop	External 24V	All
DI 4					Emergency Off	External 24V	All

Digital Inputs – 115V			
#	Point	Comments	
DI 5	High Pressure 1	115 VAC Input	3=1 & 4>1 or 3=4
DI 6	High Pressure 2	115 VAC Input	3=1 & 4>1
Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp			
#	Point	Comments	
DO 1	Compressor 1		3=1
DO 2	Compressor 3		3=1 & 4>4
DO 3	Compressor 2		3=1
DO 4	Compressor 4		3=1 & 4>6 & 4<>J
DO 5	Supply Fan		All
DO 6			NA
DO 7	Outdoor Damper Open/Close		8<>3
DO 8	Pump On/Off		3=1 & 4>1
Digital Outputs – Solid State Relays, 24-230 VAC, 0.5 A			
#	Point	Comments	
DO 9	Alarm		All
DO 10	Fan Operation		All

1. When used for LP1 and LP2, LP1 is considered CLOSED when resistance value is 0–799 or 1250–1800. Otherwise LP1 is considered OPEN. LP2 is considered CLOSED when the resistance value is 0–1249, otherwise LP2 is considered OPEN.
2. Enthalpy switch is considered CLOSED when resistance value is 0–799 or 1250–1800. Otherwise it is considered OPEN. Freezestat is considered CLOSED when the resistance value is 0–1249, otherwise it is considered OPEN.

Table 7: RTU Expansion Module A I/O

I/O							Config. Code Condition
RTU — Expansion Module A							Pos. 1 = 0
Design Flow, RPS Energy Recovery, RPS Dehumidification, 5 or 6 Compressors							
Universal Inputs/Outputs							
#	DI	AI	DO	AO	Point	Comments	Config. Code Condition
X 1				X	LSCRH Valve	0-10 VDC	28 = 4 or 5
X 2				X	Reheat #1	0-10 VDC	28 = 2
X 3				X	Reheat #2	0-10 VDC	NA
X 4		X			Supply Temp Leaving Wheel	10K Thermistor (STD)	20 > 0
X 4		X			DesignFlo 1	Ratiometric	9 > 0
X 5		X			Exhaust Temp Leaving Wheel	10K Thermistor (STD)	20 > 1
X 5		X			DesignFlo 2	Ratiometric	9 > 0
X 6		X			Relative Humidity	0-10 VDC or 4-20 mA	All
X 7		X			High Refrigerant Pressure 1 (future)	Ratiometric input required	NA
X 8		X			High Refrigerant Pressure 2 (future)	Ratiometric input required	NA
Digital Outputs — Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					Point	Comments	Config. Code Condition
DO 1					Compressor 5 / GC Stg 5		3=1 & 4=A Or 3=1 & 4=1 & 5>4
DO 2					Compressor 6 / GC Stg 6		3=1 & 4=A Or 3=1 & 4=1 & 5>6
DO 3					Reheat Output		28 = 1
DO 3					HGRH Bleed Valve		1=0 28=2or5
DO 4					Constant Speed Enthalpy Wheel	Energy Recovery	20 = 1 or 6
Digital Outputs — Triac (24 VAC, 0.5 Amp)							
#					Point	Comments	Config. Code Condition
DO 5					Bypass Damper CLOSED	Energy Recovery	20 > 0 & 8 <> 2
DO 6					Bypass Damper OPEN	Energy Recovery	20 > 0 & 8 <> 2

Table 8: SCU Expansion Module A I/O

I/O							Config. Code Condition
SCU — Expansion Module A							Pos. 1 = 1
All Units: (CO_2/Remote Min OA, Waterflow Switch, Head Pressure Control, 5 or 6 Compressors)							
Universal Inputs/Outputs							
#	DI	AI	DO	AO	Point	Comments	Config. Code Condition
X 1		X			CO_2 / Min OA / OA CFM	0–10 VDC or 4–20 mA	8 = 3 & 9 = 5 for OA CFM
X 2		X			Duct Static Pressure 1	4–20 mA	1 = 1 & 15 = 6 or A
X 3		X			OA CFM	0–10 VDC or 4–20 mA	8 = 3 or 6 & 9 = 6 for OA CFM
X 4							NA
X 5	X				Waterflow Switch	Dry Contact	3 = 1 & 4 > 1 & 22 = 0
X 6		X			Relative Humidity	0–10 VDC or 4–20 mA — Dehumidification	All
X 7		X			High Refrigerant Pressure 1	Ratiometric input required	22 = 1
X 8		X			High Refrigerant Pressure 2	Ratiometric input required	22 = 1
Digital Input – 115V-230V							
#					Point	Comments	Config. Code Condition
DI 1					OAD End Switch Input	115 VAC Input	1 = 1 & 8 = 8 or 9
Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					Point	Comments	Config. Code Condition
DO 1					Compressor 5		3 = 1 & 4 > A
DO 2					Compressor 6		3 = 1 & 4 > A
DO 3					Compressor 7		3 = 1 & 4 = F or G
DO 4							
Digital Outputs – Triac (24 VAC, 0.5 Amp)							
#					Point	Comments	Config. Code Condition
DO 5					Compressor 8		3 = 1 & 4 = F or G
DO 6							

Table 9: RTU/MPS/DPS/DPH Expansion Module B I/O

I/O							Config. Code Condition
RTU, MPS & DPS – Expansion Module B							Pos. 1≠1
Heating, F&BP Dampers, MPS Dehumidification, MPS/DPS Energy Recovery, MPS Staged Exhaust Fan							
Universal Inputs/Outputs							
#	DI	AI	DO	AO	Point	Comments	Config. Code Condition
X 1	X				FSG Ign_Pilot Input (FSG-8)	Dry Contact	1=0 & 10=4
X 1		X			Ent Fan & Lvg Coil T	10K Thermistor (STD)– Gas or Electric Heat & Dehum	(1=2) & (19=1)
X 1	X				OAD End Switch Input	Dry Contact	1=3&3=0 or 2&8=8or9
X 2	X				Gas Heat LS1 Switch	Dry Contact	1=0 & 10=4
X 2				X	Reheat#1	0-10VDC	1=2 & 28=2
X 2				X	Chilled Wtr	2-10 VDC	1=3&3= 2
X 3	X				Gas Heat LS2 Switch	Dry Contact	1=0 & 10=4
X 3		X			OA Flow	0-10VDC or 4-20 mA	1=2,3or4&8=1,2,3,5,6,7,8or9&9=6&30≠3 ,4,5or6
X 4	X				FSG Alarm Input (FSG-3)		1=0 & (10=3 or 10=4)
X 4		X			Supply Temp Leaving Wheel	10K Thermistor (STD)	1=2,3or4 & 20>0&30≠3,4,5or6
X 5		X			Exhaust Temp Leaving Wheel	10K Thermistor (STD)	1=2,3or4 & 20>0&30≠3,4,5or6
X 5		X			Duct Static Pressure 1	4-20mA	1=0&15=6 or A
X 6		X			Building Static Pressure	4-20mA	1=0&16=F or K
X 6		X			Relative Humidity	0-10VDC or 4-20mA	1=2
X 7				X	Heating Valve	2-10 VDC	[(1=0,1 or 2) or (1=3 & 3=0 or 2)] &10=1, 10=3, 10=4, 10=5, 10=7 or 10=8
X 7				X	SCR	0-10 VDC	[(1=0,1or2) or (1=3 & 3=0 or 2)] &10=6
X 8				X	F&BP Damper	0-10 VDC	1=0 or 1&3=3 or 10=1
X 8			X		Constant Speed Enthalpy Wheel	Energy Recovery	1=2 & 20=1or6
Digital Input — 115V-230V							
#					Point	Comments	Config. Code Condition
DI 1					OAD End Switch Input	115 VAC Input	1 = 2 & 8 = 8 or 9
DI 2					Freezestat Switch	115 VAC Input	[1=3 & (3=0 or 2)] OR [1=3 or 4&10=5&8=8 or 9&30≠3, 4, 5 or 6]
Digital Outputs — Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					Point	Comments	Config. Code Condition
DO 1					Gas Heat (ON/OFF)		1 = 0 or 2 10 =3 , 4, 7 or 8
DO 1					Heat Stage 1		1 = 0, 1 or 2 & 10 = 2
DO 1					SCR Enable 1		1 = 0, 1 or 2 & 10 = 6
DO 1					Constant Speed Enthalpy Wheel	Energy Recovery	1 = 3 or 4 & 20 = 1 or 6 & 30 = 1 or 2
DO 2					Pilot Gas (ON/OFF)		10 = 4
DO 2					Heat Stage 2		1 = 0, 1 or 2 & 10 = 2 & 11 > 1

DO 2	SCR Enable 2		1 = 0, 1 or 2 & 10 = 6
DO 3	Heat Stage 3		1 = 0, 1 or 2 & [10 = 8 or 10 = 2 & 11 > 2]
DO 4	Heat Stage 4		1 = 0, 1 or 2 & [10 = 8 or 10 = 2 & 11 > 3]
Digital Outputs — Triac (24 VAC, 0.5 Amp)			
#	**Point**	**Comments**	**Config. Code Condition**
DO 5	Heat Stage 5		1=0 or 1&10=2 & 11>4
DO 5	Exh Fan Stage 1		1=2 & 16=C, D or E
DO 5	Bypass Damper Closed	Energy Recovery	1=2,3 or 4&20>0 & 8=3,6,8 or 9&30≠3,4,5 or 6
DO 6	Heat Stage 6		1=0 & 10=2 & 11>5
DO 6	Exh Fan Stage 2		1=2 & 16=D or E
DO 6	Bypass Damper Open	Energy Recovery	1=2,3 or 4&20>0 & 8=3,6,8 or 9&30≠3,4,5 or 6

Table 10: SCU Expansion Module B I/O

I/O							**Config. Code Condition**
SCU — Expansion Module B							**Pos. 1 = 1**
Heating, F & BP Dampers							
Universal Inputs/Outputs							
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**	**Config. Code Condition**
X 1	X				Low Pressure 7		3=1 & 4=G & 21=0
X 2	X				Low Pressure 8		3=1 & 4=G & 21=0
X 3	X				High Pressure 7		3=1 & 4=G & 21=0
X 4	X				High Pressure 8		3=1 & 4=G & 21=0
X 5							
X 6							
X 7				X	Heating Valve	2-10 VDC	10=1 or 10=5
X 7				X	SCR	0-10 VDC	10=6
X 8				X	F&BP Damper	0-10 VDC	3=3 or 10=1
Digital Outputs — Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					**Point**	**Comments**	**Config. Code Condition**
DO 1					Heat Stage 1		10=2
DO 1					SCR Enable 1		10=6
DO 2					Heat Stage 2		10=2 & 11>1
DO 2					SCR Enable 2		10=6
DO 3					Heat Stage 3		10=2 & 11>2
DO 4					Heat Stage 4		10=2 & 11>3
Digital Outputs — Triac (24 VAC, 0.5 Amp)							
#					**Point**	**Comments**	**Config. Code Condition**
DO 5					Heat Stage 5		10 = 2 & 11 > 4
DO 6					Heat Stage 6		10 = 2 & 11 > 5

Table 11: RTU - Expansion Module C I/O

I/O							Config. Code Condition
RTU — Expansion Module C							
RTU Evaporative Condensing, VFD Compressors							
Universal Inputs/Outputs							
#	DI	AI	DO	AO	Point	Comments	Config. Code Condition
X 1	X				PS1		Pos. 1=0&7=2,3 ,4 or 5&4=4 or E
X 1				X	VFD (Comp 1)	0-10VDC	3=4
X 1				X	VFD (Comp 2)	0-10VDC	3=5
X 2	X				PS2		Pos. 1=0&7=2,3 ,4 or 5&4=4 or E
X 3		X			Sump Temperature	10K Thermistor (STD)- Evaporative Condensing	Pos. 1=0&7=2,3 ,4 or 5
X 3	X				Comp 1 Oil Status		3=4
X 3	X				Comp 2 Oil Status		3=5
X 4		X			Conductivity	4-20 mA –Evaporative Condensing	Pos. 1=0&7=2,3 ,4 or 5
X 4	X				Comp 1 Status		3=4
X 4	X				Comp 2 Status		3=5
X 5	X				LP1		Pos. 1=0&7=2,3 ,4 or 5&4=4 or E
X 6	X				LP2		Pos. 1=0&7=2,3 ,4 or 5&4=4 or E
X 6		X			Disch. Refrig. Pressure Ckt1	Ratiometric input required, (0.5-4.5 VCD:0-700psi)	3=4 or 5
X 7			X		Separator Flush Valve	0-10VDC	Pos. 1=0&7=2,3 ,4 or 5
X7		X			Disch. Refrig. Pressure Ckt2	Ratiometric input required, (0.5-4.5 VCD:0-700psi)	[1=0&3=4or5] OR [1=2&3=5]
X 8	X				Sump Water Level Switch	Dry Contact	3=4
X 8		X			Comp 1 DLT	Resistance Input, (T=0.4637R-431.72)	3=5
X 8		X			Comp 2 DLT	Resistance Input, (T=0.4637R-431.72)	3 = 4 or 5
Digital Input — 115V-230V							
#					Point	Comments	Config. Code Condition
DI 1					Condensate Drainpan Overflow	115 VAC Input	1=2 & 27=3
Digital Outputs — Relay (SPST, Normally Open, 230 VAC, 3 Amp)							
#					Point	Comments	Config. Code Condition
DO 1					SV1		Pos. 1=0&7=2,3 ,4 or 5&4=4 or E
DO 1					Cond Coil Splitter Solenoid Circuit 1		[1=0&3= 5] OR [1=2&3=4&24,25,26=040 or 050]
DO 2					Unld 1 Comp 1		Pos. 1=0&7=2,3 ,4 or 5&4=4 or E
DO 2					Cond Coil Splitter Solenoid Circuit 2		1=0&3= 5
DO 3					SV2		Pos. 1=0&7=2,3 ,4 or 5&4=4 or E
DO3					Oil Injection Override		3=4, 5, 7 ot 8
DO 4					Unld 1 Comp 2		Pos. 1=0&7=2,3,4 or 5&4=4 or E
DO 4					VFD Comp 1 Emergency Stop		3=4
DO 4					VFD Comp 2 Emergency Stop		3=5
Digital Outputs — Triac (24 VAC, 0.5 Amp)							
#					Point	Comments	Config. Code Condition
DO 5					Drain Valve	Evaporative Condensing	Pos. 1=0 & 7=2,3 ,4 or 5
DO 5					Comp 5		1=0 & [3=5 & 4=7 & 5=1] OR [3=5 & 4=J & 5=2] OR [3=5 & 4=A & 5=3]
DO 6					Sump Pump	Evaporative Condensing	Pos. 1=0 & 7=2,3 ,4 or 5

Table 12: SCU Expansion Module C I/O

I/O							Config. Code Condition
SCU — Expansion Module C							Pos. 1 = 1
One Compressor Per Circuit							
Universal Inputs/Outputs							
#	DI	AI	DO	AO	Point	Comments	Config. Code Condition
X 1	X				Low Pressure 3	Dry Contact	3 = 1 & 4 = 5, 6, 8, 9, B or C & 21 = 0
X 2	X				Low Pressure 4	Dry Contact	3 = 1 & 4 = 8, 9, B or C & 21 = 0
X 3	X				High Pressure 3	Dry Contact	3 = 1 & 4 = 5, 6, 8, 9, B or C & 21 = 0
X 4	X				High Pressure 4	Dry Contact	3 = 1 & 4 = 8, 9, B or C & 21 = 0
X 5	X				Low Pressure 5	Dry Contact	3 = 1 & 4 = B or C & 21 = 0
X 6	X				Low Pressure 6	Dry Contact	3 = 1 & 4 = B or C & 21 = 0
X 7	X				High Pressure 5	Dry Contact	3 = 1 & 4 = B or C & 21 = 0
X 8	X				High Pressure 6	Dry Contact	3 = 1 & 4 = B or C & 21 = 0
Digital Input – 115V-230V							
#					Point	Comments	Config. Code Condition
DI 1					Condensate Drainpan Overflow	115 VAC Input	1=1 & 27=3
Digital Outputs — Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					Point	Comments	Config. Code Condition
DO 1							
DO 1							
DO 2							
DO 2							
DO 3							
DO 4							
Digital Outputs — Triac (24 VAC, 0.5 Amp)							
#					Point	Comments	Config. Code Condition
DO 5							
DO 6							

Table 13: DPS/DPH Expansion Module D I/O

I/O							Config. Code Condition
Expansion Module D							Pos. 1=3or4 & 3=4
Analog Inputs — NTC							
#					Point	Comments	Config. Code Condition
AI 1					Indoor Refrigerant Temperature (IRT)	10K Thermistor (STD)	1=4&30=3,4,5 or 6&24, 25, 26<16
AI 2					Outdoor Refrigerant Temperature (ORT)	10K Thermistor (STD)	1=4&30=3, 4, 5 or 6&24, 25, 26<16
AI 3					Outdoor Coil Defrost Temperature (DFT)	10K Thermistor (STD)	1=4&30=3, 4, 5 or 6&24, 25, 26<16
Universal Inputs/Outputs							
#	DI	AI	DO	AO	Point	Comments	Config. Code Condition
X 1		X			Compressor Suction Pressure Sensor (PTS)	0.5–4.5 VDC 0–350 psi	
X 2		X			Compressor Discharge Pressure Sensor (PTD)	0.5–4.5 VDC 0–700 psi	
X 3		X			INV Compressor Discharge Line Refrigerant Temperature (DRT1)	200K Thermistor (HT)	
X 4		X			STD3 Compressor Discharge Line Refrigerant Temperature (DRT3)	200K Thermistor (HT)	4 = M
X 5				X	Heating Valve	Gas 2–10 VDC, HW/STM 2–10 VDC, SCR 0–10 VDC	10 = 5, 6, 7, or 8
X 6		X			Compressor Suction Line Refrigerant Temperature (SRT)	10K Thermistor (STD)	
X 7		X			Outdoor Coil Defrost Temperature (DFT)	10K Thermistor (STD)	1=4&[(30=1 or 2) or (24, 25, 26>15)]
X 7		X			INV Compressor Body Temperature	100K Thermistor (HT)	24, 25, 26=0, 1, 5
X 8				X	Reheat Output	0–10 VDC	28=2
X 9		X			Supply Temp Leaving Wheel	10K Thermistor (STD)	20>0&30=3, 4, 5 or 6
X 10		X			Exhaust Temp Leaving Wheel	10K Thermistor (STD)	20>0&30=3, 4, 5 or 6
X 11		X			OA Flow	0–10 VDC or 4–20 mA	8=1, 2, 3, 5, 6, 7, 8 or 9&9=6&30=3, 4, 5 or 6
X 12		X			Freezestat Switch	0-5 VDC	[10=5]&8=8 or 9&30=3, 4, 5 or 6
Digital Input — 115V-230V							
#					Point	Comments	Config. Code Condition
DI 1					Freezestat Switch	115 VAC Input	[8≠8 or 9]&[10=5]&[(30<3) OR (1≠4) OR (24, 25, 26>015)]
DI 1					OAD End Switch Input	115 VAC Input	1=3&8=8 or 9
DI 4					Freezestat Switch	115 VAC Input	1=4&10=5&[8≠8 or 9]&(24, 25, 26<16)&(30>2)
DI 4					OAD End Switch Input	115 VAC Input	1=4&8=8 or 9&(24, 25, 26<16)

Digital Outputs — Relay (SPST, Normally Open, 230 VAC 3 Amp)			
#	**Point**	**Comments**	**Config. Code Condition**
DO 1	INVBoard Power Up		24,25,26=003, 004, 005, 006, 007, 008, 010, 012 or 015
DO 1	VFD Cmp Emergency Stop		24, 25, 26=016, 018, 020, 025 or 028
DO 2	Refrigerant Receiver Gas Line Solenoid Valve (SVR)		1=4&Unit Size≤015
DO 2	HGRH Solenoid		Unit Size>015&28=2
DO 3	Bypass Solenoid Valve (SVB)		
DO 4	4 Way Reversing Valve (4WV)		1=4
Digital Outputs — Triac (24 VAC, 0.5 Amp)			
#	**Point**	**Comments**	**Config. Code Condition**
DO 5	Bypass Damper CLOSED	Energy Recovery	20>0 & 8=3, 6, 8 or 9&30=3, 4, 5 or 6
DO 6	Bypass Damper OPEN	Energy Recovery	20>0 & 8=3, 6, 8 or 9&30=3, 4, 5 or 6
EV Drivers			
#	**Point**	**Comments**	**Config. Code Condition**
EV1	Indoor Expansion Valve	Danfoss Valve: 300 step/sec, Bipolar 2625 steps, OvrDrvCl=263 steps, OvrDrvOp=0 steps, Current=115mA, HoldCurrent=50	30=3, 4, 5, 6 or 7
EV2	Outdoor Expansion Valve	Saginomia Small Valve: 30 step/sec, Unipolar 240 steps, OvrDrvCl=20 steps, OvrDrvOp=20steps Small Valve: Current=130mA Large Valve: Current=190mA, HoldCurrent=0 Danfoss Valve (old): 300 step/sec, Bipolar 2625 steps, OvrDrvCl=263 steps, OvrDrvOp=0 steps, Current=115mA, HoldCurrent=50 Danfoss Valve (new): 200 step/sec, Bipolar 800 steps, OvrDrvCl=50 steps, OvrDrvOp=0 steps, Current=500mA, HoldCurrent=0	30=3, 4, 5, 6 or 7&24, 25, 26<16

Table 14: RTU/SCU/MPS/DPS/DPH Expansion Module E I/O

I/O							Config. Code Condition
Expansion Module E							Pos. 1 = 0, 1, 2, 3 or 4
Simultaneous OA Flow and CO_2 OA Reset							
Universal Inputs/Outputs							
#	DI	AI	DO	AO	Point	Comments	Config. Code Condition
X 1		X			OA Flow	0-10VDC or 4-20 mA	[1=0&8=1, 2, 3, 5, 6 or 7 &9=6]&15≠C
X1		X			Duct Static Pressure	4-20mA	1=0 or 1&15= C
X 2		X			Building Static Pressure	4-20mA	1=0 or 1&16=M
X 3				X	SAF Capacity Command	0-10VDC	15= C or D
X 4		X			SAF Capacity Feedback	0-10VDC or 4-20mA fro VFD	15= C or D
X 5				X	RFEF Capacity Command	0-10VDC	16=M or N
X 6		X			RFEF Capacity Feedback	0-10VDC or 4-20mA fro VFD	16=M or N
X 7	X				SAF Status Input (Fault/OK)	Digital Input from VFD	15= C or D
X 8	X				RFEF Status Input (Fault/OK)	Digital Input from VFD	16=M or N
Digital Input — 115V-230V							
#					Point	Comments	Config. Code Condition
DI 1							
Digital Outputs — Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					Point	Comments	Config. Code Condition
DO 1					SAF VFD On/Off		15= C or D
DO 2					RF/EFF VFD On/Off		16=M or N
DO 3							
DO 4							
Digital Outputs — Triac (24 VAC, 0.5 Amp)							
#					Point	Comments	Config. Code Condition
DO 5							
DO 6							

Field Wiring

⚠ CAUTION

Miswiring field-installed accessories or sensors can damage the controller. Do not deviate from the prescribed wiring directions in this document.

Below are descriptions of the various options and features that may require field wiring to the MicroTech unit controller. Refer to the job plans and specifications and the as-built wiring schematics for information regarding the specific unit. The field needs to be careful not to ground their transformer for a field signal to chassis ground. Use the same ground as the Microtech unit controller to prevent any voltage potential from damaging the internal components of the controller.

Field Output Signals

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

Remote Alarm Output

The Remote Alarm Output (MCB-DO9) supplies 24 VAC to terminal 115 on the field terminal block (TB2) when the output is on. To use this signal, wire the coil of a field supplied and installed 24 VAC pilot relay across terminals 115 and 117 on TB2. When this output is on, 24 VAC is supplied from the control transformer through the output relay to energize the field relay. Refer to the as-built wiring diagrams.

The digital alarm output indicates the alarm group that contains the highest priority active alarm. This output (MCB-DO9) is On when no alarms are active. The options for the action of this output when an alarm in a group occurs are On, Fast Blink, Slow Blink, or Off. These can be edited via the Alarm Out Config menu in the Extended menus on keypad/display. The default values for the three groups of alarms are:

Warnings - Off
Problems - Slow Blink
Faults - Fast Blink

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

VAV Box Signal/Fan Operation Signal

The Fan Operation output affects Binary Output # 10 when the VAVBox_FanOp parameter is set to FanOp (0). The VAV Output affects Binary Output # 10 when the VAVBox_FanOp parameter is set to VAVBx (1). Binary Output #10 is wired to a set of field terminals for field use. The VAV output is also avaible to the field via network communications. The settings can be changed via network BacNet MSV14/Lonworks UNVTvav box output.

Fan Operation

The Fan Operation Output (MCB-DO10) supplies 24 VAC to terminal 116 or 217 dependent on the unit in question on the field terminal block (TB2) when the output is on. To use this signal, wire the coil of a field supplied and installed 24 VAC pilot relay across terminals 116 and 117 or 216 and 217 dependent on the unit in question. When this output is on, 24 VAC is supplied from the control transformer through the output relay to energize the field relay. Refer to the as-built wiring diagrams to determine the correct terminal numbers.

The Fan Operation output is on when the unit is not OFF and when both the unit is OFF and airflow is detected. It is OFF when the unit is OFF and airflow is not detected.

VAV Output

In the Heating state, the VAV Output is turned off to indicate that hot air instead of the normal cool air is being supplied to the VAV boxes. The VAV boxes are driven to their Heating Position when hot air is provided based on either the normally open or normally closed contacts of the VAV output. The VFD will continue to be controlled to maintain the desired duct static pressure. This output is also off when the unit is in the Startup or Recirculation states. If this output is in the Heat (off) position when the unit enters the Fan Only state or Minimum DAT Control state, the output remains off for an adjustable Post Heat Time. When the Unit State is Off, the VAV Box Output is in the Cool (on) position unless airflow is detected. When airflow is detected, it switches to the Heat (off) position.

Cooling Only Units

For cooling only VAV systems, the VAV Box Output can override zone thermostat control and drive the VAV boxes fully open to facilitate air circulation during the Recirc operating state. During this time, the VAV Box Output is in the OFF (or heat) position (field-installed pilot relay de-energized). VAV units have a “post heat” control feature that forces the VFD speed to a minimum before turning on the VAV Box Output when the Recirc operating state is complete. Post heat operation prevents excessive duct static pressure that could otherwise occur when the zone thermostats regain VAV box control. The setting of a “post heat” timer determines the duration of post heat operation. This timer is set to zero at the factory and must be set to a non-zero value to enable the “post heat” function.

Units with Modulating Heat

The VAV Box Output should be used to switch the VAV boxes between heating and cooling control. While the unit is in Startup, Recirc, or Heating operating state (UnocHtg, MWU, or Heating), the VAV Box Output is in the OFF (or heat) position (field-installed pilot relay de-energized) switching the VAV boxes into heating operation.

VAV units have a “post heat” control feature that forces the VFD speed to a minimum before closing the VAV Box Output when the unit leaves the Recirc or Heating operating state. “Post heat” operation prevents excessive duct static pressure that could otherwise occur when the zone thermostats regain VAV box control. When the unit is not in Startup, Recirc, or Heating operating state, the VAV Box Output is in the ON (or cool) position (field-supplied pilot relay energized) switching the boxes to cooling control.

Staged Cooling Outputs

Rooftop air handlers can be ordered with factory-installed evaporator coils and the capability to control up to eight stages of field-supplied cooling equipment. The MicroTech unit controller outputs designated for these applications are DO 1-4 and DO 7,8 on the MCB and DO 1,2 on Expansion board A. These outputs are wired to terminal block TB4 in the main control panel for connection to the field supplied condensing unit. Refer to the as-built wiring schematics for the unit.

Outdoor Damper

When applicable the Outdoor Damper Output supplies 24 VAC to terminal 119 on the field terminal block (TB2) when the output is on. To use this signal, wire the coil of a field supplied and installed 24 VAC pilot relay across terminals 119 and 117 on TB2. When this output is on, 24 VAC is supplied from the T3 control transformer through the output relay to energize the field relay. Refer to the as-built wiring diagrams.

This function also provides a binary outdoor damper output when an SCU unit is configured for 100% outdoor air operation.

Pump Signal

When applicable the Pump Signal Output supplies 24 VAC to terminal 113 on the field terminal block (TB2) when the output is on. To use this signal, wire the coil of a field supplied and installed 24 VAC pilot relay across terminals 113 and 117 on TB2. When this output is on, 24 VAC is supplied from the T3 control transformer through the output relay to energize the field relay. Refer to the as-built wiring diagrams.

With SCU applications, the pump output is on if:

- Both of the following are true:
  - A waterside economizer is installed AND The unit is in the Economizer state.
  - The Unit is in the Start Initial state AND Flush Mode is set to Yes.
  - The unit has a waterside economizer AND the Freeze Timer Active flag (FrzTmrAct) is true.
- Either of the following are true:
  - Unit State=FanOnly.
  - UnitState=Econo.
  - The Bypass Valve output is being driven open.
  - The unit is the Mechanical Cooling state.

Field Analog Input Signals

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

NOTE: The field needs to be careful not to ground their transformer for a field signal to chassis ground. They need to use the same ground as the controller to prevent a voltage potential above 3V. This voltage potential can damage the MicroTech Unit Controller.

Zone Temperature Sensor Packages

A zone temperature sensor (ZNT1) is optional for all units except for the 100% outdoor air.

Zone Control unit in which case one is required. In all unit configurations, however, a zone temperature sensor is required to take advantage of any of the following standard controller features:

- Unoccupied heating or cooling
- Pre-occupancy purge
- Discharge air reset based on space temperature (DAC units only)
- Remote timed tenant override
- Remote set point adjustment (CAV-ZTC units only)

A Zone Setpoint Source (Apply Tstat change =No/Yes) parameter is provided on the keypad/display to allow for setting the setpoint via the zone thermostat input. The menu is located in the Heating/Cooling Changeover Setup menu of the Commission Unit section. When Apply Tstat change is set to No, the Occupied Cooling Setpoint and the Occupied Heating Setpoint may be set through the keypad or via a network signal (all units). In this case these setpoints are changed whenever the network or keypad value changes.

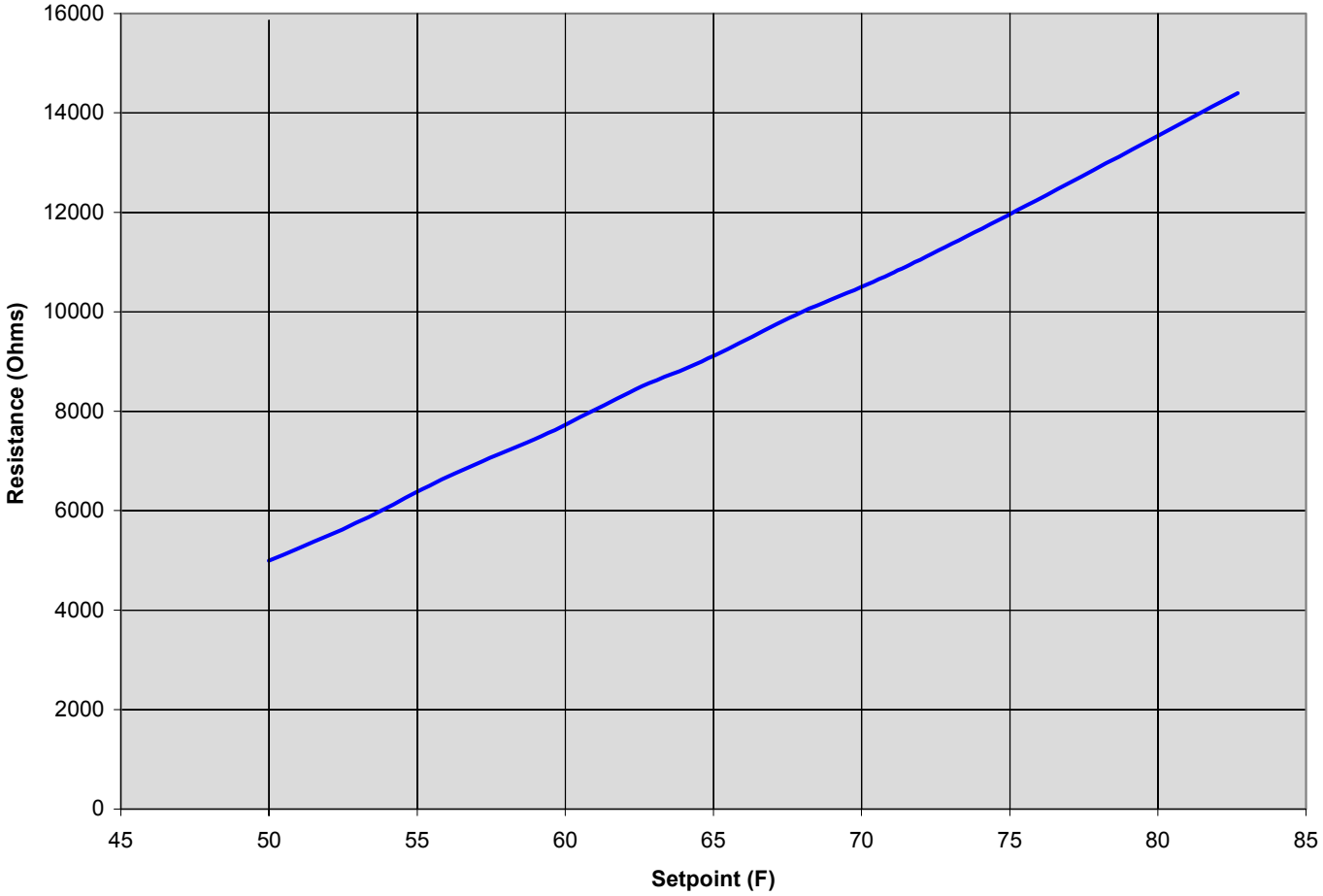
When Apply Tstat change is set to Yes these setpoints can only be adjusted through the zone thermostat. This option is available for all control types (Zone, DAT, and Single zone VAV). Heating and cooling setpoints must not overlap. The Occupied Heating Setpoint must be equal to or less than the Occupied Cooling Setpoint. If a conflict occurs from values entered via the keypad or network, Occupied Heating Setpoint is automatically adjusted down to eliminate the conflict.

When Apply Tstat change =No, the Occupied Heating and Cooling setpoints may be changed manually by changing the setpoint displayed on the keypad.

When Apply Tstat change =Yes, the Occupied Cooling Setpoint is set through a setpoint adjustment included with a wall mounted space sensor. When the Occupied Cooling Setpoint is changed by more than 0.5 degrees through the wall mounted sensor, the Occupied Heating Setpoint is raised or lowered the same amount so that the difference between the Cooling and Heating setpoints does not change.

The dead band between the Occupied Cooling Setpoint and the Occupied Heating Setpoints can be set by setting the Apply Tstat change to No, setting the differential via the keypad and resetting the Apply Tstat change back to Yes. The setpoint adjustment is a resistance value that varies from 5000 ohm to 15000 ohms.

Figure 25: MicroTech Wallstat Resistance vs. Setpoint



Resistance vs. Temperature for Setpoint Adjustment on the MicroTech

Ohms	T (°F)	T (°C)
5000	50	10
6000	54	12
7000	57	14
8000	61	16
9000	64	18
10000	68	20
11000	72	22
12000	75	24
13000	79	26
14000	82	28
15000	86	30

Zone Sensor w/o Remote Set Point Adjustment

The standard MicroTech room temperature sensor package that does not include set point adjustment can be used with any applied rooftop MicroTech unit control configuration. It includes a tenant override button. This zone sensor must be field installed and field-wired to the unit using twisted pair, shielded cable (Belden 8761 or equivalent).

NOTE: Shield cable ground should be terminated at the control panel.

Zone Sensor with Remote Set Point Adjustment

The standard MicroTech room temperature sensor package equipped with a set point adjustment potentiometer can be used with any applied rooftop MicroTech unit control configuration. This sensor package also includes a tenant override button. This zone sensor package must be field installed and field wired to the unit using twisted, shielded cable. Four conductors with a shield wire are required. Cable with 22 AWG conductors (Belden 8761 or equivalent) is sufficient.

NOTE: Shield cable ground should be terminated at the control panel.

Tenant Override (Timed)

The tenant override button provided with the two optional zone temperature sensor packages can be used to override unoccupied operation for a programmed time period. This time period is adjustable between 0 and 5 hours using the Tenant Override parameter in the Timer Settings menu in the Extended Menus of the keypad/display (default is 2 hours). Except for the fact that it is temporary, tenant override operation is identical to occupied operation. Pressing and releasing the push button switch on the sensor momentarily shorts zone temperature sensor ZNT1, resetting and starting the override timer. The unit then starts up and runs until the override timer times out.

NOTE: Hold the button in for at least 1 second but not more than 30 seconds.

Zone Sensor with Temperature, Humidity and Remote Set Point Adjustment

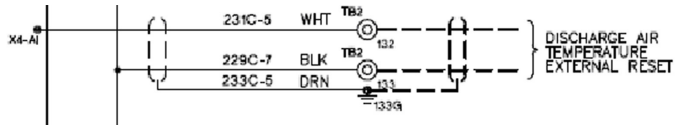
The optional MicroTech room temperature humidity sensor package equipped with a set point adjustment potentiometer can be used with any applied rooftop MicroTech unit control configuration. This sensor package also includes a tenant override button. This zone sensor package must be field installed and field wired to the unit using twisted, shielded cable.

External Discharge Air Reset Signal

The discharge air temperature set point on DAC units can be reset by an external voltage or current signal applied to analog input MCB-AIX4. Under commission unit, heating and cooling set up menus. External reset requires a field supplied reset signal in the range of 0–10VDC, 2-10VDC, 0-20 mA, or 4-20 mA wired to terminals 132 and 133 on the field terminal block (TB2). Refer to the unit wiring diagrams or typical wiring diagrams on page 44 for wiring termination details. If the external reset option is selected, the controller linearly resets the cooling and heating discharge air temperature set points between user-programmed minimum and maximum values as the field supplied reset signal varies from a minimum to maximum (or maximum to minimum) value.

The external reset signal must be field-wired to the unit using a twisted pair, shielded cable (Belden 8761 or equivalent). Cable with 22 AWG conductors is sufficient.

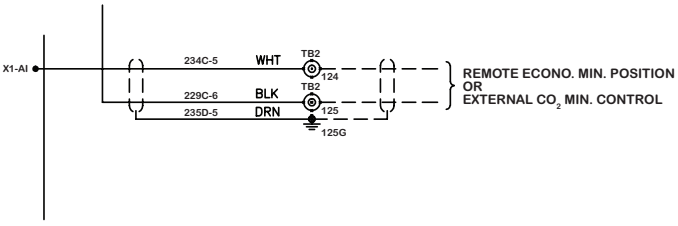
Figure 26: External Discharge Air Reset Signal Wiring Diagram



External Outdoor Air Damper Reset Signal

On units equipped with a 0-100% modulating economizer the minimum outside air damper position set point can be reset by an external voltage or current signal. The external reset method can be selected with the Min OA Reset parameter in the Min OA Damper menu in the commission unit menu via the controller keypad/display. External reset requires a field supplied reset signal in the range of 0-10 VDC or 0-20 mA wired to terminals 124 and 125 on the field terminal block (TB2). Refer to the unit wiring diagrams for wiring termination details. If the external reset option is selected, the controller linearly resets the outside air damper position set point between user-programmed minimum (Demand Control Ventilation Limit) and maximum (Ventilation Limit) values as the field supplied reset signal varies between a minimum and maximum (or maximum to minimum) value. The external reset signal must be field-wired to the unit using a twisted pair, shielded cable (Belden 8761 or equivalent). Cable with 22 AWG conductors is sufficient.

Figure 27: External Outdoor Air Damper Reset Signal Wiring Diagram

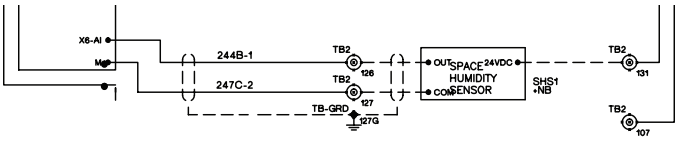


Humidity Sensors

Either a wall mount or duct mount Humidity sensor is available. The sensor must be wired to terminals 126, 127 and 131 on the unit field terminal block (TB2). Terminal 126 is wired to OUT, terminal 127 to COM and terminal 131 to IN on the humidity sensor. These terminals are factory wired to the Expansion Board A AIX6. The sensor can deliver 0-10VDC or 0- 20mA, the type of signal (VDC or mA) and the 0% and 100% RH values are adjustable via the Dehum Setup menu in the Commission Unit section on the keypad/display.

There are different types of humidity sensors available verify proper wiring connections with the electrical prints supplied with the unit.

Figure 28: Humidity Sensor Wiring Diagram



Field Digital Input Signals

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

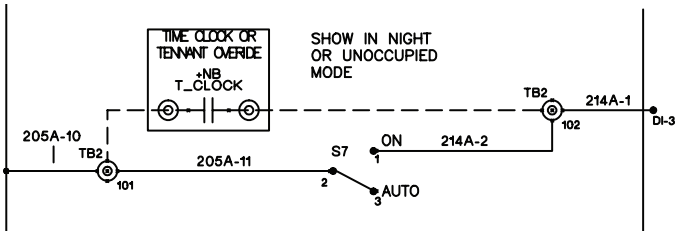
External Time Clock or Tenant Override

There are several methods of switching the rooftop unit between occupied and unoccupied operation. It can be done by the controller internal schedule, a network schedule, an external time clock, or a tenant override switch.

If the internal schedule or a network schedule is used, field wiring is not required.

An external time clock or a tenant override switch can be used by installing a set of dry contacts across terminals 101 and 102 on the field terminal block (TB2). Larger tonnage Rebel models 16 tons and up will use terminal numbers 200 and 201, reference the wiring diagrams that were delivered with the unit in question. When these contacts close, 24 VAC is applied to binary input MCB-DI3, overriding any internal or network schedule and placing the unit into occupied operation (provided the unit is not manually disabled). When the contacts open (24 VAC is removed from MCB-DI3) the unit acts according to the controller internal time schedule or a network schedule. Refer to the unit wiring diagrams for specific wiring termination details.

Figure 29: Time Clock/Tenant Override Wiring Diagram



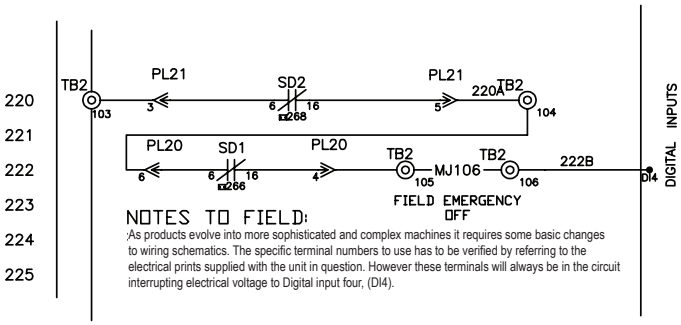
Emergency Shutdown

The terminals 105 & 106 on TB2 can be used for any field supplied component that requires a unit emergency shutdown. When these terminals are used, the factory installed jumper must be removed.

Larger tonnage 16 to 28 ton Rebel models use terminals 202, 203, 204, 205, 206, as a series of terminals when not used by an external device to open the circuit to DI4 have a mechanical jumper connecting the terminals in numeric order.

NOTE: Emergency shutdown Faults can be set to automatically clear once the condition that caused the alarm is corrected. This can be accomplished by navigating to Service menu/Alarm Configuration/ alarm config, and changing the default of ManClr to AutoClr.

Figure 30: Emergency Shutdown Wiring Diagram



OA Damper Flow Station with CO_2 Reset Setup

- At the MicroTech controller enter password 6363.
- Scroll down to “Unit Configuration” and click on it.
- Scroll down to “OA Flow Stn” and select “6” for “FS/Rst”.

9	OA Flow Station	**0 = NONE** 1 = DF_015–030 (800) 2 = DF_036–042 (802) 3 = DF_045–075 (047) 4 = DF_080–135 (077) 5 = Generic Flow Station 6 = DGeneric Flow Station w/ CO_2 7 = Ebtron MB

- Scroll up to “Apply Changes” and select “yes” which will cause the controller to restart.
- Enter password 6363 then scroll down to “Commission unit” and click on it.
- Scroll down to “Min OA setup” menu and click on it.
- Scroll down to Min OA reset and select “IAQ VDC” or “IAQ mA” depending on the type of sensor installed.
- Scroll up to “Apply Changes” and select “yes” which will cause the controller to restart.

CO_2 Sensor Wiring

AI 3					Outdoor Temperature	10K Thermistor (STD)	All
Universal Inputs/Outputs							
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**	**Config. Code Condition**
X 1		X			CO_2 /Min OA/OA CFM	0–10VDC or 4–20 mA	8 = 1, 2, 3, 5, 6, 7, 8 or 9
X 2		X			Low Pressure 1 and 2[1]	1K & 2K Ohm Input	3 = 1 & 4 > 1 & 4 < H
X 2				X	Chilled Wtr	2–10 VDC	3 = 2 or 3 = 3

On all style units (MPS/DPS/RTU/SCU) the CO_2 sensor needs to be wired to terminals X1 and M at the MicroTech Unit Controller. Terminal M is the common for all analog inputs. Make sure the field wiring polarity is correct to read a valid PPM value. See Table 5 on page 25.

NOTE: The CO2 sensor (and all field installed devices) must be powered from the same transformer as the controller to prevent damage to the controller.

EBTRON or Field OA Flow Station Wiring

MPS (17-50 Tons)/DPS Expansion Module B

X 2				X	Reheat #1	0–10 VDC	1 = 2 & 28 = 2
X 3	X				Gas Heat LS2 Switch	Dry Contact	1 = 0 & 10 = 4
X 3		X			OA Flow	0–10 VDC or 4–20 mA	1 = 2, 3 or 4 & 8 = 1, 2, 3, 5, 6 or 7 & 9 = 6 & 30 ≠ 3, 4, 5 or 6
X 4	X				FSG Alarm Input (FSG-3)		1=0 & (10=3 or 10=4)
X 4		X			Supply Temp Leaving Wheel	10K Thermistor (STD)	1 = 2, 3 or 4 & 20 > 0 & 30 ≠ 3, 4, 5 or 6
X 5		X			Exhaust Temp Leaving Wheel	10K Thermistor (STD)	1 = 2, 3 or 4 & 20 > 0 & 30 ≠ 3, 4, 5 or 6

See Table 9 on page 28.

RTU/SCU/MPS (62-70 Tons) Expansion Module E

#	DI	AI	DO	AO	Point	Comments	Config. Code Condition
X 1		X			OA Flow	0–10 VDC or 4–20 mA	1 = 0 & 8 = 1, 2, 3, 5, 6 or 7 & 9 = 6
X 2							

On Maverick (MPS) and Rebel (DPS) units the OA flow station needs to be wired to terminals X3 and M on expansion module B. On Rooftop (RTU) and Self Contained (SCU) units, the OA flow station needs to be wired to terminals X1 and M on expansion module E. Terminal M is common for all analog inputs. Make sure the polarity is correct on the field wiring to read a valid CFM value. See Table 14 on page 33.

Cooling: Multistage

Compressor Staging

The following table is provided for reference indicating the compressors that are included in each circuit for all the RTU and SCU compressor configurations.RTU & SCU Compressor/ Circuit Configurations.

Table 15: RTU & SCU Compressor/Circuit Configurations

Comp Config	Circuit #1	Circuit #2	Circuit #3	Circuit #4	Circuit #5	Circuit #6	Circuit #7	Circuit #8
2/2/2	1	2	NA	NA	NA	NA	NA	NA
2/2/3	1	2	NA	NA	NA	NA	NA	NA
3/2/4 (RTU R22/R407 & SCU)	1 & 3	2	NA	NA	NA	NA	NA	NA
3/2/4 (RTU R410A)	1	2 & 4	NA	NA	NA	NA	NA	NA
3/3/3	1	2	3	NA	NA	NA	NA	NA
4/2/4	1 & 3	2 & 4	NA	NA	NA	NA	NA	NA
4/4/4	1	2	3	4	NA	NA	NA	NA
6/2/6	1, 3 & 5	2, 4 & 6	NA	NA	NA	NA	NA	NA
6/6/6	1	2	3	4	5	6	NA	NA
6/3/6	1 & 3	2 & 4	5 & 6	NA	NA	NA	NA	NA
8/4/8	1 & 3	2 & 4	5 & 7	6 & 8	NA	NA	NA	NA
8/8/8	1	2	3	4	5	6	7	8

RTU/SCU-Two Unequal Sized Compressors, Two Circuits, Three Stages (2/2/3)

With this configuration there is only one fixed sequence. If both circuits are enabled the Maximum Cooling stages is set to 3. If circuit 2 is disabled the maximum cooling stages is set to 1 and compressor 1 is staged on and off to maintain the temperature setpoint. If circuit 1 is disabled the maximum cooling stages is set to 2 and compressor 2 is staged on and off to maintain the temperature setpoint.

If a circuit is disabled and then becomes re-enabled, no change occurs until a new stage up or down request occurs. At this time the staging is re-aligned to the “normal” condition for the new stage.

NOTE: During this re-alignment, the cooling stage time guaranteed on and off times must be observed as well as a minimum of 10 seconds between starting more than one compressor.

Table 16: RTU Standard Staging

Compressor Staging			
Staging Sequence	**Stage 1 Compressor**	**Stage 2 Compressors**	**Stage 3 Compressors**
Std-1	1	2	1, 2
StgdClgCap	33%	67%	100%

RPS/SCU-Two Small Comps on Circuit # 1, One Large Comp on Circuit # 2, Four Stages (RTU w/3/4/2 R22 or R407C or SCU)

With this configuration there are two fixed sequences used when both circuits are enabled.

If both circuits are enabled, the staging sequence is Std-1 if compressor # 1 has fewer hours than compressor # 3 and the staging sequence is Std-2 if compressor # 1 does not have fewer hours than compressor # 3. If Circuit #1 is disabled compressor # 2 is staged on and off to maintain the temperature setpoint. If Circuit #2 is disabled the staging sequence is set to Std-1 if comp #1 has fewer hours than comp #3 and the staging sequence is set to Std-2 if comp #1 does not have fewer hours than comp #3. If a circuit is disabled and then becomes re-enabled, no change occurs until a new stage up or down request occurs. At this time the staging is re-aligned to the “normal” condition for the new stage. When both circuits are enabled the staging sequence is changed only when the number of stages is zero or Maximum Cooling stages.

NOTE: During this re-alignment, the cooling stage time guaranteed on and off times must be observed as well as a minimum of 10 seconds between starting more than one compressor.

Table 17: RPS/SCU Standard Staging

Compressor Staging				
Staging Sequence	**Stage 1 Compressor**	**Stage 2 Compressors**	**Stage 3 Compressors**	**Stage 4 Compressors**
Std-1	1	1, 3	2, 3	1, 2, 3
Std-2	3	3, 1	1, 2	1, 2, 3
StgdClgCap	25%	50%	75%	100%

RPS-Two Small Comps on Circuit # 2, One Large Comp on Circuit # 1, Four Stages (3/4/2-410A, RTU)

With this configuration there are two standard and two alternate fixed sequences used when both circuits are enabled.

If both circuits are enabled and modulating hot gas reheat dehumidification is not active, the staging sequence is Std-1 if compressor # 2 has fewer hours than compressor # 4, and the staging sequence is Std-2 if compressor # 2 does not have fewer hours than compressor # 4. If both circuits are enabled and modulating hot gas reheat dehumidification is active, the staging sequence is Alt-1 if compressor # 2 has fewer hours than compressor # 4, and the staging sequence is Alt-2 if compressor # 2 does not have fewer hours than compressor # 4. Stage 3 is skipped in these sequences. If Circuit #2 is disabled, compressor # 1 is staged on and off to maintain the temperature setpoint.

If Circuit #1 is disabled the staging sequence is set to Std-1 if comp #2 has fewer hours than comp #4 and the staging sequence is set to Std-2 if comp #2 does not have fewer hours than comp #4.

If a circuit is disabled and then becomes re-enabled, no change occurs until a new stage up or down request occurs. At this time the staging is re-aligned to the “normal” condition for the new stage.

NOTE: During this re-alignment, the cooling stage time guaranteed on and off times must be observed as well as a minimum of 10 seconds between starting more than one compressor.

When both circuits are enabled the staging sequence is changed only when the number of stages is zero or Maximum Cooling stages.

Table 18: RPS Standard Staging

Compressor Staging				
Staging Sequence	**Stage 1 Compressor**	**Stage 2 Compressors**	**Stage 3 Compressors**	**Stage 4 Compressors**
Std-1	2	2, 4	1, 2	1, 2, 4
Std-2	4	2, 4	4,1	1, 2, 4
Alt-1	2	2, 4	NA	1, 2, 4
Alt-2	4	2, 4	NA	1, 2, 4
StgdClgCap	25%	50%	75%	100%

SCU-One Small Comp on Circuit #1, One Large Comp on Circuit #2, on Large or Small Comp or Circuit #3, Four Stages (3/3/4-410A, SCU)

With this configuration there are two possible fixed sequences used when all three circuits are enabled.

If all three circuits are enabled and compressor # 3 run hours are greater than compressor # 1 run hours, the staging sequence is Std-1. If all three circuits are enabled and compressor # 1 run hours are greater than compressor # 3 run hours, the staging sequence is Std-2. If Circuit # 1 is disabled, compressor # 2 and # 3 are staged on and off to maintain the temperature setpoint. Maximum cooling stages is set to 3. If Circuit # 2 is disabled, compressor # 1 and # 3 are staged on and off to maintain the temperature setpoint. Maximum cooling stages is set to 2. If Circuit # 3 is disabled, compressor # 1 and # 2 are staged on and off to maintain the temperature setpoint. Maximum cooling stages is set to 3.

If a circuit is disabled and then becomes re-enabled, no change occurs until a new stage up or down is requested. At this time the staging is re-aligned to the “normal” condition for the new stage.

— **NOTE:** During this re-alignment, the cooling stage time guaranteed ON and OFF times must be observed as well as a minimum of 10 seconds between starting more than one compressor.

If a circuit is disabled, its compressors do not run and are not considered in runhour comparisons.

Table 19: SCU Standard Staging

Compressor Staging				
Staging Sequence	**Stage 1 Compressor**	**Stage 2 Compressors**	**Stage 3 Compressors**	**Stage 4 Compressors**
Std-1	1	2	1, 2	1, 2, 3
Std-2	1	2	3, 2	1, 2, 3
StgdClgCap	25%	50%	75%	100%

RPS/SCU-Equal Number and Size Compressors on Circuits (2/2/2, 3/3/3, 4/4/4, 4/2/4, 6/2/6 6/6/6, 6/3/6, 8/8/8 & 8/4/8)

With these configurations the first step is to determine the Lead Compressor based on Lead Circuit, WRV Control and the Circuit Staging Method according to the table below. Once the Lead Compressor is established and turned on, the subsequent compressor staging is based on compressor run hours and the Circuit Staging Method according to the table below.

If a circuit is disabled its compressors do not run and are not considered in run hour comparisons. The Lead Compressor is re-evaluated whenever the number of compressor stages is zero or the maximum stages for the unit. When more than one option is presented in the table below, the compressor with the fewest run hours is chosen as the Lead Compressor.

Once the Lead Compressor is on, the inactive compressor with the fewest run hours is chosen to turn on next upon a call for increased capacity.

Upon a call for decreased capacity the operating compressor that is not the Lead Compressor with the most run hours is turned off next.

The Lead Compressor is turned off last upon a call for decreased capacity.

If a circuit on a 4/2/4 or 6/2/6 configuration is disabled and then becomes re-enabled, no change occurs until a new stage up or down request occurs. At this time the staging is realigned to the “normal” condition for the new stage.

NOTE: During this re-alignment, the cooling stage time guaranteed on and off times must be observed as well as a minimum of 10 seconds between starting more than one compressor.

When dehumidification with hot gas reheat becomes active, the Lead Circuit changes automatically to Lead Circuit=2 and the Circuit Staging Method changes automatically to ALT. When this occurs while compressors are already operating, the staging condition must be re-aligned according to the Lead Circuit=2 and Circuit Staging Method=ALT specification in the table below.

NOTE: During this re-alignment, the cooling stage time guaranteed on and off times must be observed as well as a minimum of 10 seconds between starting more than one compressor.

Table 20: RPS/SCU Standard Staging

Standard Staging		
Staging Sequence	**Stage 1 Compressor**	**Stage 2 Compressors**
Std-1	1	1,2
Std-2	2	1,2
StgdClgCap	50%	100%

Table 21: Circuit Staging Method

Compressor Configuration	Lead Circuit/WRV Control	Circuit Staging Method	Lead Compressor	Lead Circuit	Subsequent Compressor Staging	Subsequent Circuit Staging
2/2/2	Lead Circuit=1 No WRV	NA	1	1	2	2
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2	2	1	1
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1 or 2	1 or 2	1 or 2	1 or 2
	Lead Circuit =Auto WRV					
3/3/3	Lead Circuit=1 No WRV	NA	1	1	Compressor with low run hours	Circuit with compressor with low run hours
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2 or 3	1, 2 or 3		
	Lead Circuit =Auto WRV		1 or 2	1 or 2		
4/4/4	Lead Circuit=1 No WRV	NA	1	1	Compressor with low run hours	Circuit with compressor with low run hours
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2, 3 or 4	1, 2, 3 or 4		
	Lead Circuit =Auto WRV		1 or 2	1 or 2		
4/2/4	Lead Circuit=1 No WRV	STD	1 or 3	1	Compressor on appropriate circuit with low run hours	Circuit loading alternates as stage increases
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2 or 4	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2, 3 or 4	1 or 2*		
	Lead Circuit =Auto WRV					
	Lead Circuit=1 No WRV	ALT (or dehum. active)	1 or 3	1		Lead circuit is fully loaded before lag circuit begins loading
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2 or 4	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2, 3 or 4	1 or 2		
	Lead Circuit =Auto WRV					
6/6/6	Lead Circuit=1 No WRV	NA	1	1	Compressor with low run hours	Circuit with compressor with low run hours
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2, 3, 4, 5 or 6	1, 2, 3, 4, 5 or 6		
	Lead Circuit =Auto WRV		1 or 2	1 or 2		

Table 21 continued: Circuit Staging Method

Compressor Configuration	Lead Circuit/WRV Control	Circuit Staging Method	Lead Compressor	Lead Circuit	Subsequent Compressor Staging	Subsequent Circuit Staging
6/2/6	Lead Circuit=1 No WRV	STD	1, 3 or 5	1	Compressor on appropriate circuit with low run hours	Circuit loading alternates as stage increases
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2, 4 or 6	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2, 3, 4, 5 or 6	1 or 2*		
	Lead Circuit =Auto WRV					
	Lead Circuit=1 No WRV	ALT (or dehum. active)	1, 3 or 5	1		Lead circuit is fully loaded before lag circuit begins loading
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2, 4 or 6	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2, 3, 4, 5 or 6	1 or 2		
	Lead Circuit =Auto WRV					
6/3/6	Lead Circuit=1 No WRV	NA	1 or 3	1	Compressor with low run hours	Circuit with compressor with low run hours
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2 or 4	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2, 3, 4, 5 or 6	1, 2 or 3		
	Lead Circuit =Auto WRV		1, 2, 3 or 4	1 or 2		
8/8/8	Lead Circuit=1 No WRV	NA	1	1	Compressor with low run hours	Circuit with compressor with low run hours
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2, 3 or 4	1, 2, 3 or 4		
	Lead Circuit =Auto WRV		1 or 2	1 or 2		
8/4/8	Lead Circuit=1 No WRV	NA	1 or 3	1	Compressor with low run hours	Circuit with compressor with low run hours
	Lead Circuit =1 WRV					
	Lead Circuit =2 No WRV		2 or 4	2		
	Lead Circuit =2 WRV					
	Lead Circuit =Auto No WRV		1, 2, 3, 4, 5, 6, 7 or 8	1, 2, 3 or 4		
	Lead Circuit =Auto WRV		1, 2, 3 or 4	1 or 2		

* When Lead Circuit=Auto and the Circuit Staging Method is STD, the “lead” circuit is re-evaluated based on run hours whenever the number of operating compressors on the circuits is equal.

MPS015 through MPS050, 2, 3 or 4 Compressors 2 Circuits

Fixed staging sequences are provided for MPS units. The compressor state will normally be as indicated in the Standard Sequences table below for each compressor stage. The staging will be as indicated in the Alternate Sequences table below when the unit is configured for modulating hot gas reheat control and dehumidification operation is active. When any circuit is disabled, the compressors on that circuit are turned off immediately. Staging continues normally when a circuit is disabled.

NOTE: Dehumidification operation is disabled when circuit 1 is disabled since this is the circuit equipped with the hot gas reheat.

When the unit has staged up to the maximum stage with one circuit disabled and that circuit is enabled, a 10 second delay between compressor starts is used and a cooling stage time must have elapsed since an individual compressor was stopped before it is restarted.

Table 22: MPS Standard Staging

Unit Configuration	Compressor Number	Circuit	Compressor Model	MBH	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
UnitType=2		Compressor State=			1	12			
CoolingType=1	1	1	083		x	x			
Comp Config=4	2	2	068			x			
Unit Size=015					54%	100%			
UnitType=2		**Compressor State=**			**3**	**2**	**1**	**23**	**12**
CoolingType=1	**1**	**1**	**083**				**x**		**x**
Comp Config=D	**3**	**1**	**041**		**x**			**x**	
Unit Size=015	**2**	**2**	**068**			**x**		**x**	**x**
					30%	**46%**	**54%**	**72%**	**100%**
UnitType=2		Compressor State=			1	12			
CoolingType=1	1	1	083		x	x			
Comp Config=4	2	2	090			x			
Unit Size=017					48%	100%			
UnitType=2		**Compressor State=**			**3**	**1**	**2**	**23**	**12**
CoolingType=1	**1**	**1**	**083**			**x**			**x**
Comp Config=D	**3**	**1**	**041**		**x**			**x**	
Unit Size=017	**2**	**2**	**090**				**x**	**x**	**x**
					28%	**48%**	**52%**	**76%**	**100%**
UnitType=2		Compressor State=			1	2	13	23	123
CoolingType=1	1	1	068		x		x		x
Comp Config=D	3	1	068				x	x	x
Unit Size=020	2	2	083			x		x	x
					35%	40%	66%	71%	100%
UnitType=2		Compressor State=			3	13	12	123	
CoolingType=1	1	1	054			x	x	x	
Comp Config=3	3	1	054		x	x		x	
Unit Size=020	2	2	120				x	x	
					25%	46%	75%	100%	
UnitType=2		Compressor State=			1	2	13	23	123
CoolingType=1	1	1	068		x		x		x
Comp Config=D	3	1	068				x	x	x
Unit Size=025	2	2	120			x		x	x
					30%	48%	56%	74%	100%
UnitType=2		Compressor State=			3	13	12	123	
CoolingType=1	1	1	083			x		x	
Comp Config=3	3	1	083		x	x	x	x	
Unit Size=026	2	2	083				x	x	
					37%	63%	71%	100%	

Table 22 continued: MPS Standard Staging

Unit Configuration	Compressor Number	Circuit	Compressor Model	MBH	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
UnitType=2		Compressor State=			3	1	23	12	123
CoolingType=1	1	1	120	123		x		x	x
Comp Config=D	3	1	090	93	x		x		x
Unit Size=030	2	2	090	93			x	x	x
					37%	44%	67%	74%	100%
UnitType=2		Compressor State=			3	1	23	12	123
CoolingType=1	1	1	120	123		x		x	x
Comp Config=D	3	1	090	93	x		x		x
Unit Size=035	2	2	120	123			x	x	x
					34%	43%	69%	78%	100%
UnitType=2		Compressor State=			3	13	12	123	
CoolingType=1	1	1	120	123		x	x	x	
Comp Config=3	3	1	120	123	x	x		x	
Unit Size=040	2	2	120	123			x	x	
					35%	68%	73%	100%	
UnitType=2		Compressor State=			3	34	12	134	1234
CoolingType=1	1	1	120				x	x	x
Comp Config=E	3	1	090		x	x		x	x
Unit Size=040	2	2	120						x
	4	2	090			x		x	x
					26%	48%	63%	74%	100%
UnitType=2		Compressor State=			3	13	12	123	1234
CoolingType=1	1	1	120	123		x	x	x	x
Comp Config=E	3	1	120	123	x	x		x	x
Unit Size=050	2	2	120	123			x	x	x
	4	2	120	123					x
					30%	52%	57%	81%	100%

Table 23: Alternate Sequences (Dehumidification)

Unit Configuration	Compressor Number	Circuit	Compressor Model	MBH	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
UnitType=2		Compressor State=			1	12			
CoolingType=1	1	1	083		x	x			
Comp Config=4	2	2	068			x			
Unit Size=015					54%	100%			
UnitType=2		Compressor State=			3	1	12		
CoolingType=1	1	1	083			x	x		
Comp Config=D	3	1	041		x				
Unit Size=015	2	2	068				x		
					30%	54%	100%		
UnitType=2		Compressor State=			1	12			
CoolingType=1	1	1	083		x	x			
Comp Config=4	2	2	090			x			
Unit Size=017					48%	100%			
UnitType=2		Compressor State=			3	1	12		
CoolingType=1	1	1	083			x	x		
Comp Config=D	3	1	041		x				
Unit Size=017	2	2	090				x		
					28%	48%	100%		
UnitType=2		Compressor State=			1	13	123		
CoolingType=1	1	1	068		x	x	x		
Comp Config=D	3	1	068			x	x		
Unit Size=020	2	2	083				x		
					35%	66%	100%		
UnitType=2		Compressor State=			3	13	123		
CoolingType=1	1	1	054			x	x		
Comp Config=3	3	1	054		x	x	x		
Unit Size=020	2	2	120				x		
					25%	46%	100%		
UnitType=2		Compressor State=			1	13	123		
CoolingType=1	1	1	068		x	x	x		
Comp Config=D	3	1	068			x	x		
Unit Size=025	2	2	120				x		
					30%	56%	100%		
UnitType=2		Compressor State=			3	13	123		
CoolingType=1	1	1	083			x	x		
Comp Config=3	3	1	083		x	x	x		
Unit Size=026	2	2	083				x		
					37%	63%	100%		
UnitType=2		Compressor State=			3	1	13	123	
CoolingType=1	1	1	120	123		x	x	x	
Comp Config=D	3	1	090	93	x		x	x	
Unit Size=030	2	2	090	93				x	
					37%	44%	77%	100%	
UnitType=2		Compressor State=			3	1	13	123	
CoolingType=1	1	1	120	123		x	x	x	
Comp Config=D	3	1	090	93	x		x	x	
Unit Size=035	2	2	120	123				x	
					34%	43%	73%	100%	
UnitType=2		Compressor State=			3	13	123		
CoolingType=1	1	1	120	123		x	x		
Comp Config=3	3	1	120	123	x	x	x		
Unit Size=040	2	2	120	123			x		
					35%	68%	100%		

Table 23 continued: Alternate Sequences (Dehumidification)

Unit Configuration	Compressor Number	Circuit	Compressor Model	MBH	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
UnitType=2		Compressor State=			3	13	134	1234	
CoolingType=1	1	1	120			x	x	x	
Comp Config=E	3	1	090		x	x	x	x	
Unit Size=040	2	2	120					x	
	4	2	090				x	x	
					26%	54%	74%	100%	
UnitType=2		Compressor State=			3	13	123	1234	
CoolingType=1	1	1	120	123		x	x	x	
Comp Config=E	3	1	120	123	x	x	x	x	
Unit Size=050	2	2	120	123			x	x	
	4	2	120	123				x	
					30%	52%	81%	100%	

Communication Module

Network Communications

See the Installation & Maintenance Manuals below for detailed instructions.

ED 15112	MicroTech Rooftop and Self Contained Unit Controller Protocol Information

Typical Electrical Drawings - RoofPak

Figure 31: RPS Electrical Diagram

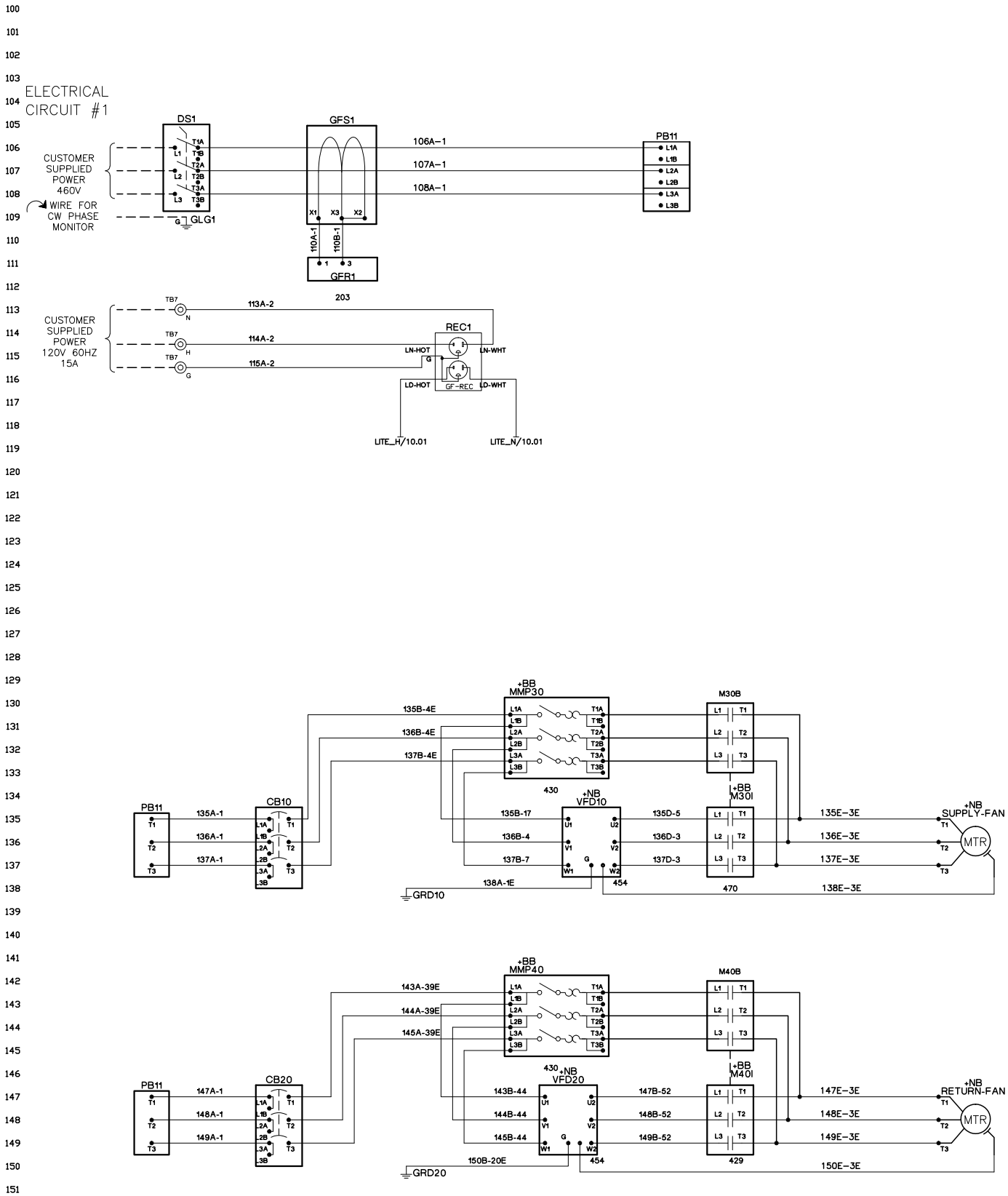


Figure 31 continued: RPS Electrical Diagram

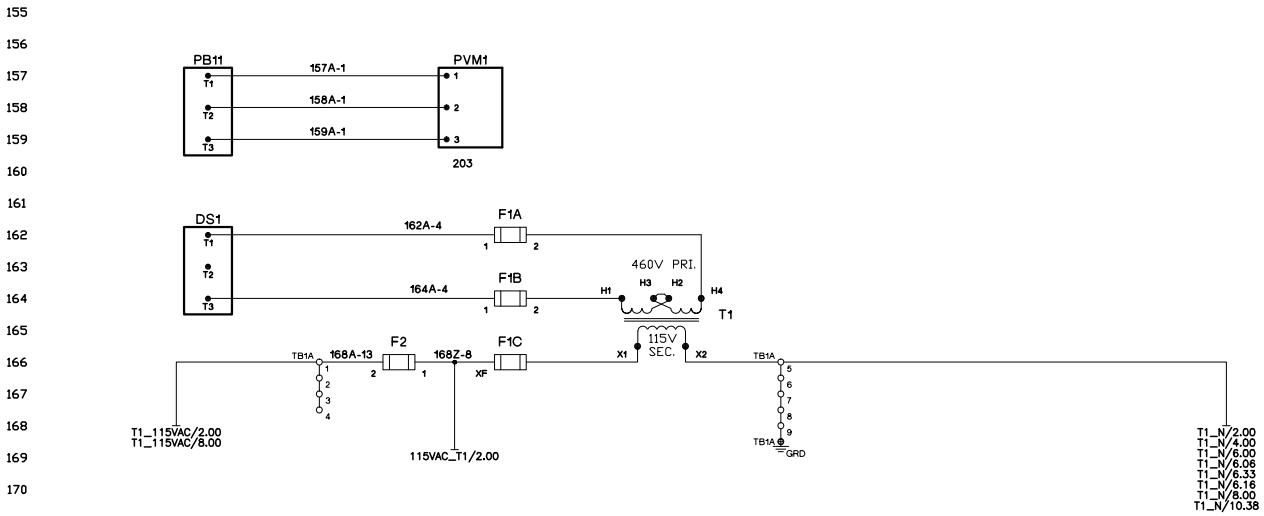


Figure 31 continued: RPS Electrical Diagram

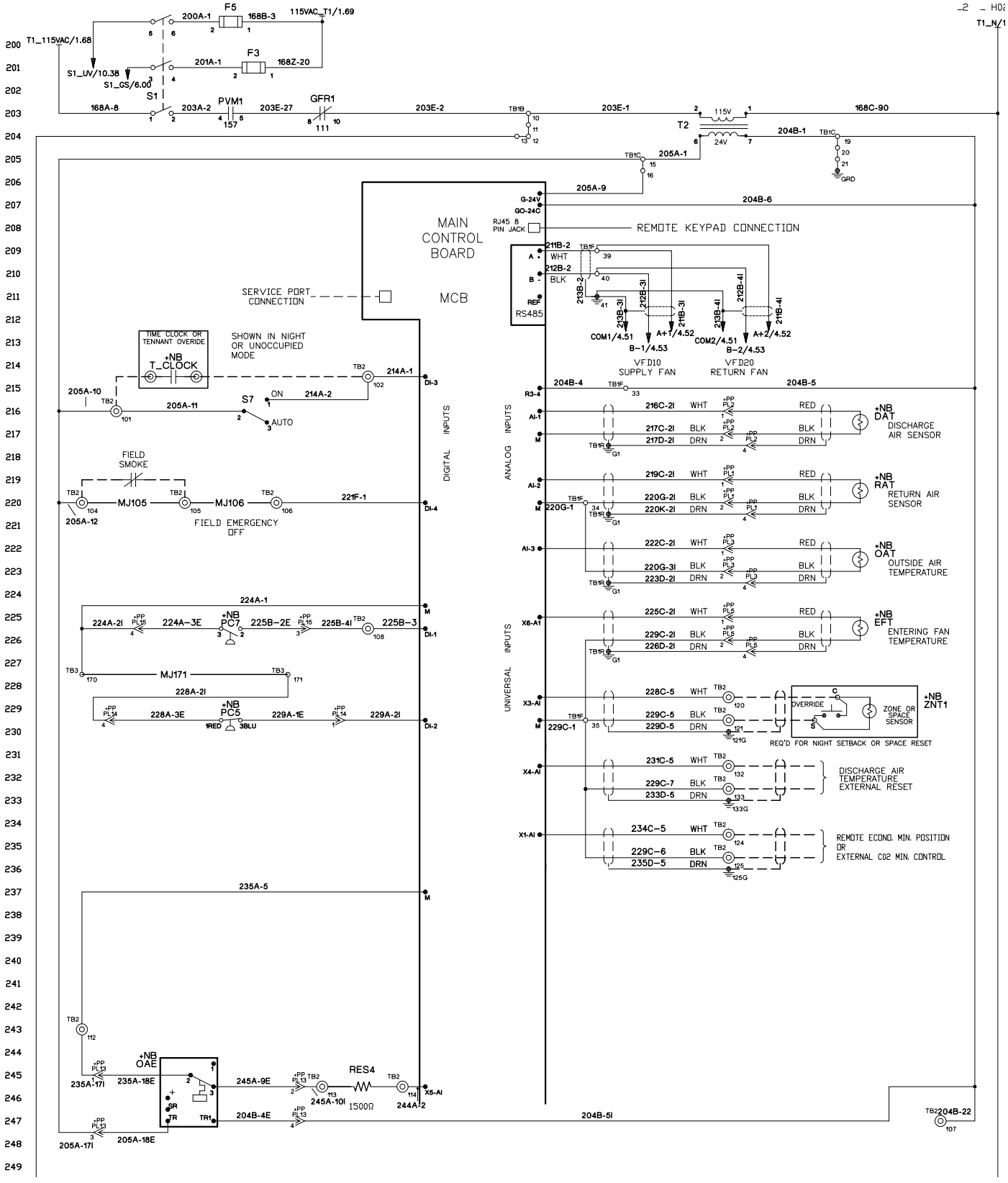


Figure 31 continued: RPS Electrical Diagram

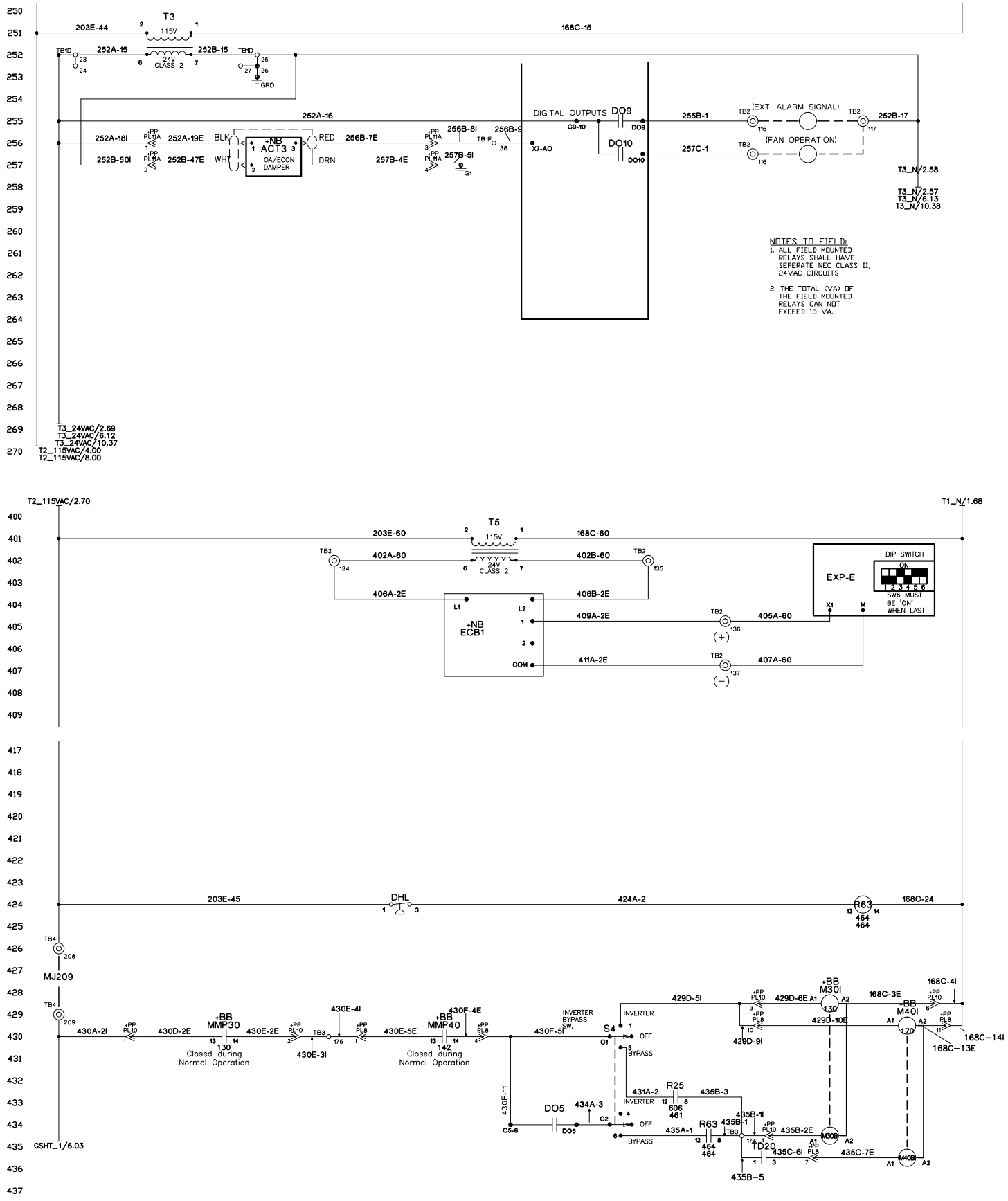


Figure 31 continued: RPS Electrical Diagram

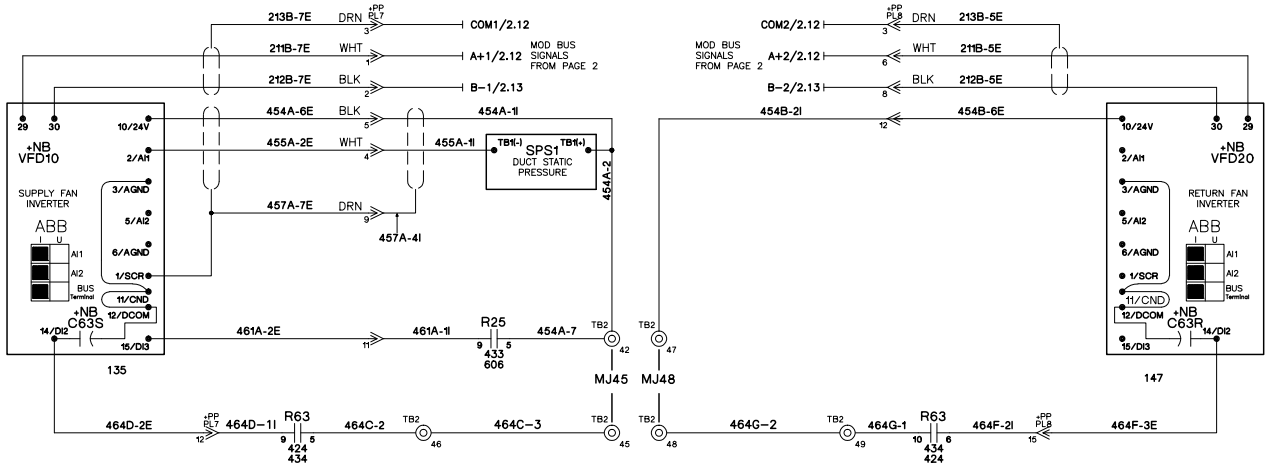
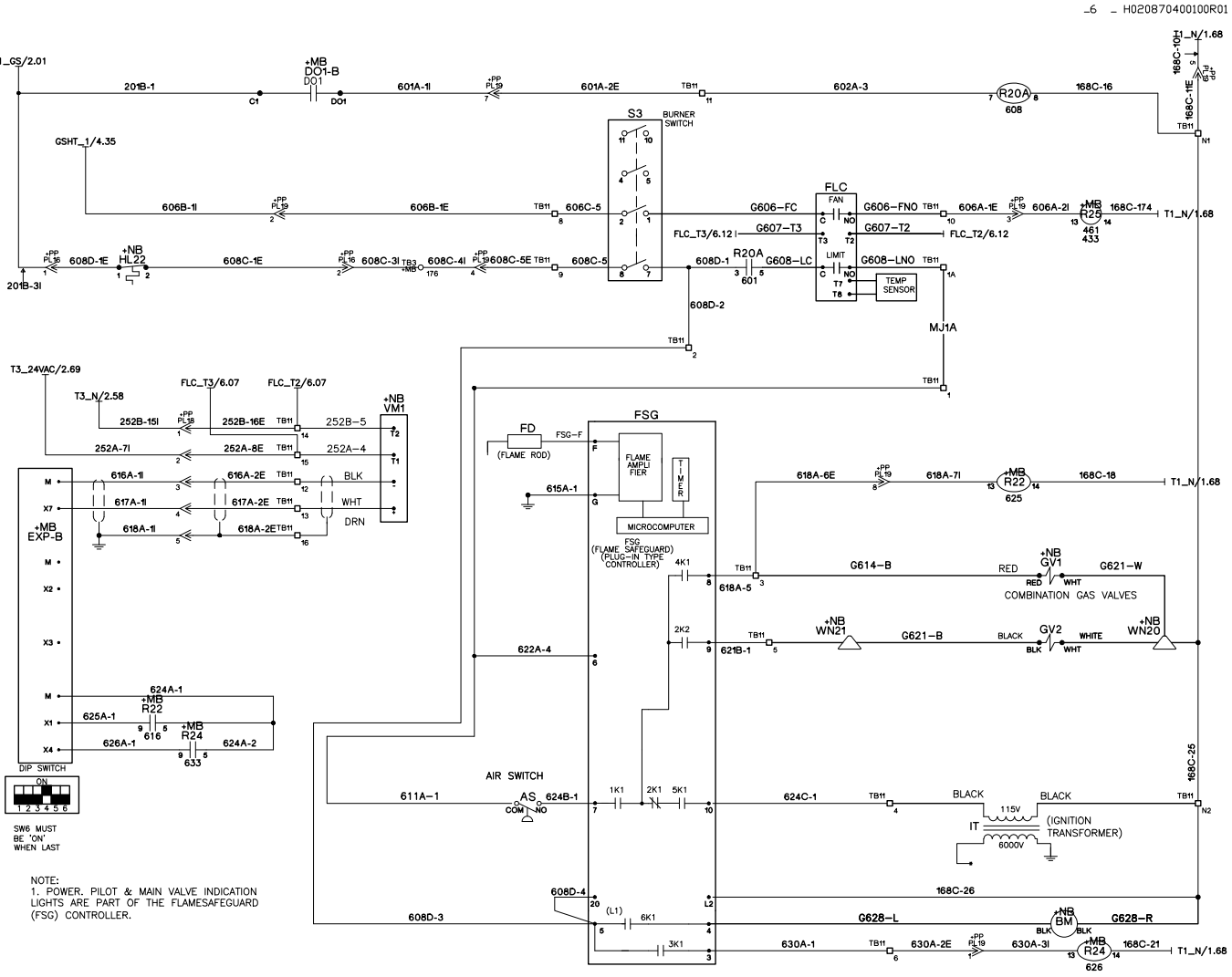


Figure 31 continued: RPS Electrical Diagram



SEQUENCE OF OPERATION

When 120V power is furnished through the system on/off switch (S1), through the burner on/off switch (S3), through the high limit control (FLC), terminal #6 on the flame safeguard (FSG) is powered on a call for heat.

Whenever power is restored to the flame safeguard, the flame safeguard will go through a 10 second initiation period before the prepurge period will begin. The burner air control valve will be at minimum position during off cycles. Upon a call for heat or any other time that a prepurge cycle occurs, the air control valve will be repositioned to the maximum position for prepurge and then returned to the minimum position for low fire start.
Upon a call for heat, the controller will close digital output (EXPB–DO1) and energize the R20A relay. Once the normally open contacts of the R20A relay close 120V power is supplied to terminal #6 on the FSG. The FSG then energizes its terminal #4, which powers the burner combustion air blower moter (BM) and starts the FSG prepurge cycle. Blower operation is sensed by the Air Switch (AS), which makes the terminal FSG–6 to FSG–7 during the prepurge cycle.

After completion of the FSG prepurge period there will be a 10 second trial for ignition during which terminal #8 (combination gas valve – GV1) and terminal #10 (ignition transformer – IT) will be energized. If flame is being detected through the flame rod (FD) at the completion of the 10 second trial for ignition period, terminal #10 (ignition transformer – IT) will be de–energized and terminal #9 (main gas valves – GV2 and GV3) will be energized and the control system will be allowed to control the firing rate once the heating stage timer (default 5 minutes) has passed. After the flame has lit and been proven and the heating stage time has passed, the controller will modulate (VM1) to the required firing rate via analog output EXPB–AO_X7. In the event the flame fails to ignite or the flame safeguard fails to detect its flame within 10 seconds, terminal #4, 8, 9, and 10 will be de–energized, thus de–energizing the burner. The FSG will then lockout and would require manual resetting. If the FSG lockout occurs, FSG terminal #3 will energize the R24 alarm input status relay which will 'make' a digital input to the controller (EXPB–DI_X4). When this digital input is 'made' the controller will drive VM1 to the clased position. At the same time EXPB–DO2 will open, the prepurge sequence will be disabled and reset. If the FSG terminal #8 de–energizes relay R22 (EXPB–DI_X1) after having it turned on and the FSG is not off on safety lockout, the controller will drive the VM1 to the closed position.
If an attempt is made to reset the FSG or if an automatic restart is initiated after flame failure, the earlier described FSG prepurge cycle will be repeated.
If the unit overheats, the high limit control (FLC) will cycle the burner, limiting furnace temperature to the limit control set point. The flame safeguard contains 'LEDS' (lower left corner) that will glow to indicate operation.

Figure 31 continued: RPS Electrical Diagram

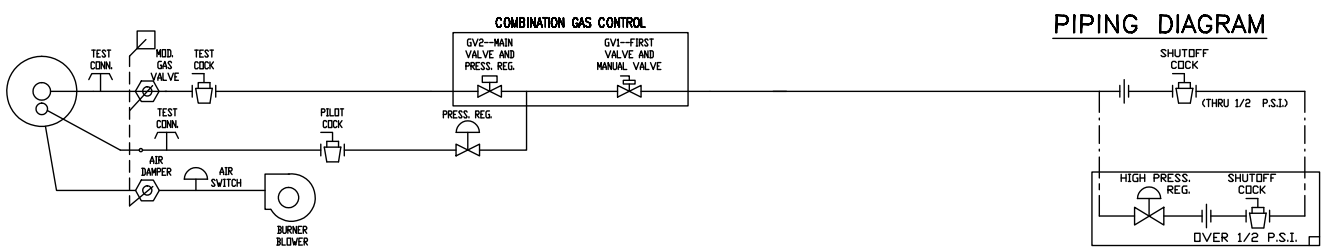


Figure 32: RPS with Fixed Speed Scroll Compressors

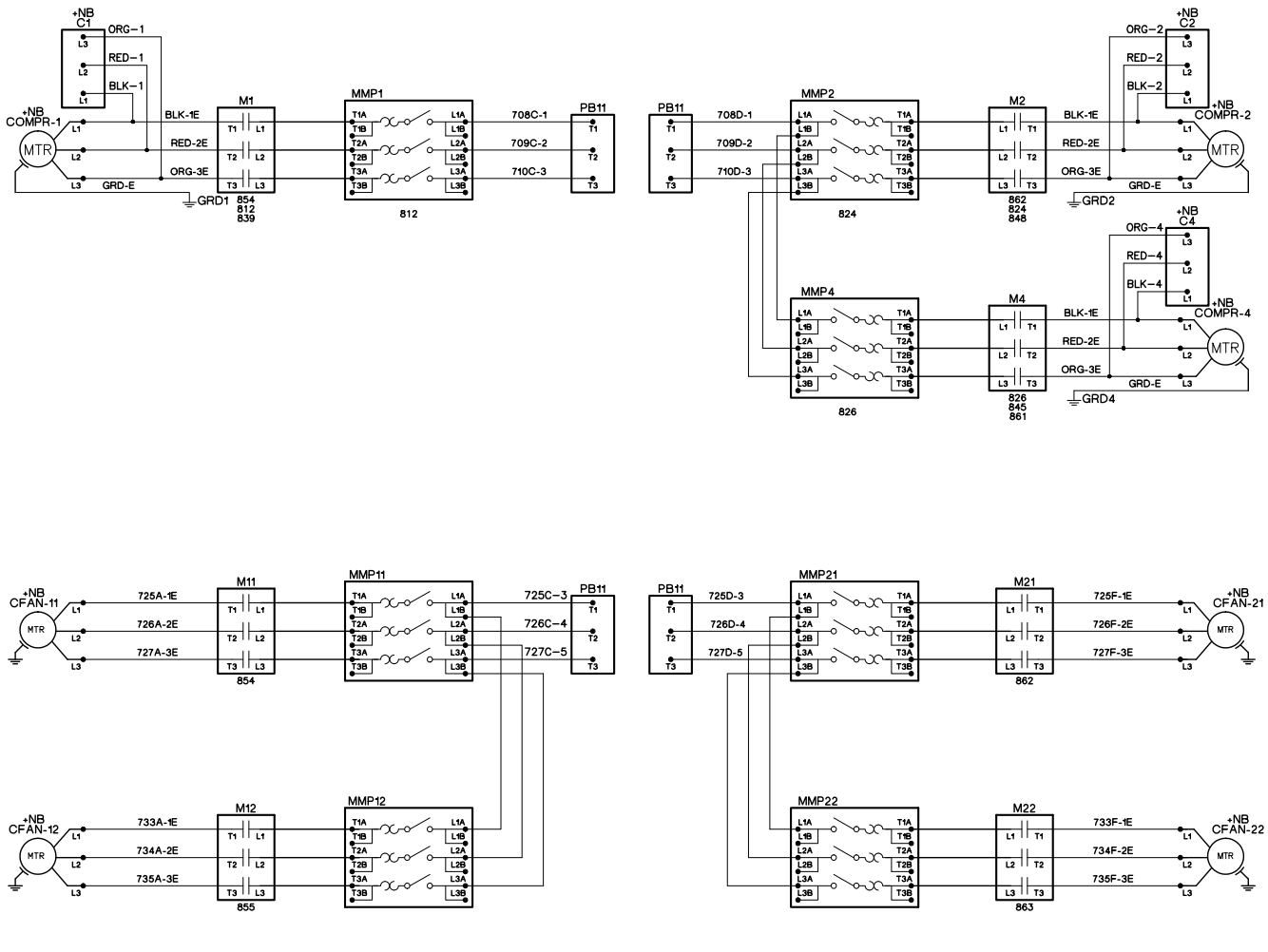


Figure 32 continued: RPS with Fixed Speed Scroll Compressors

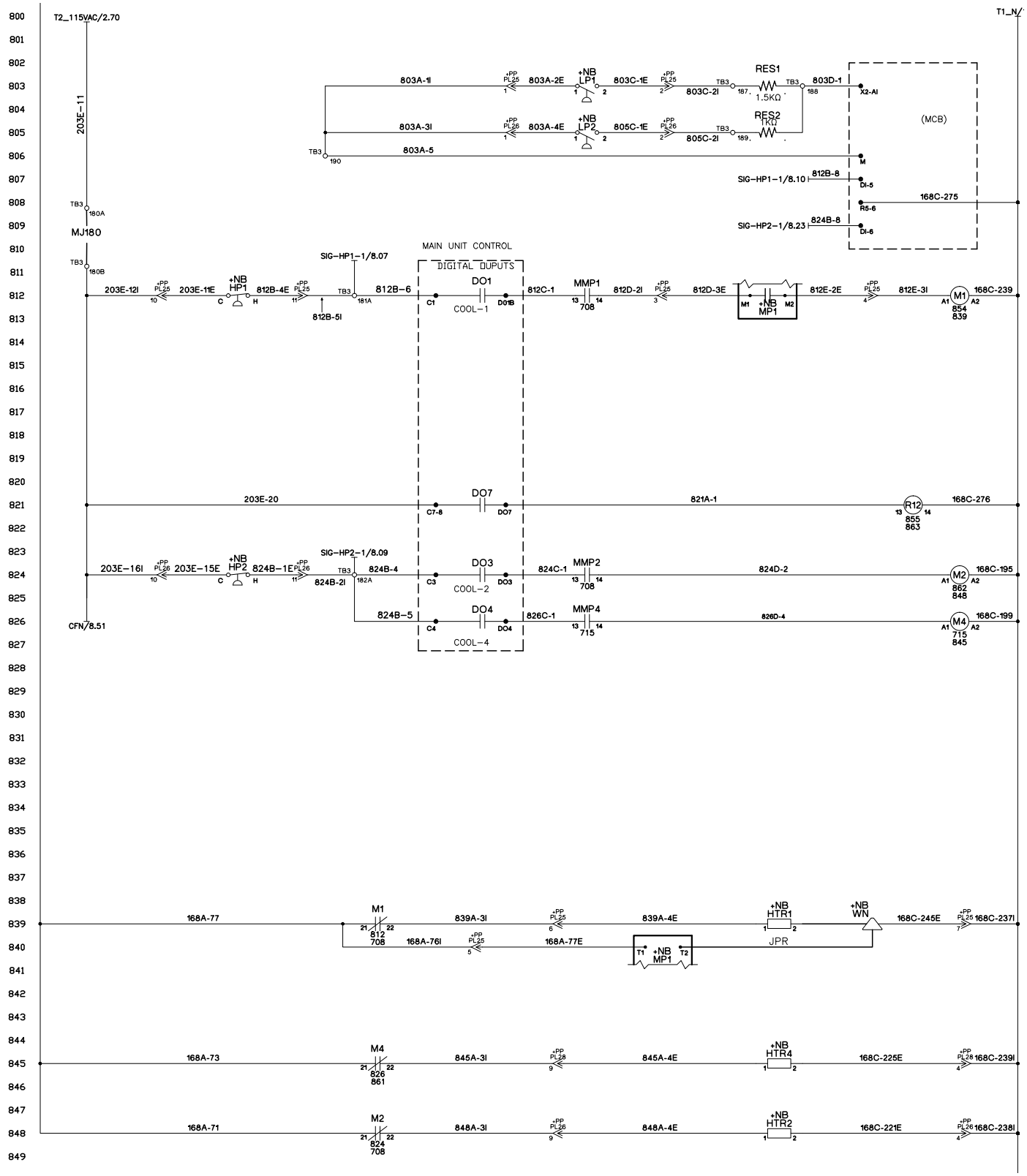


Figure 32 continued: RPS with Fixed Speed Scroll Compressors

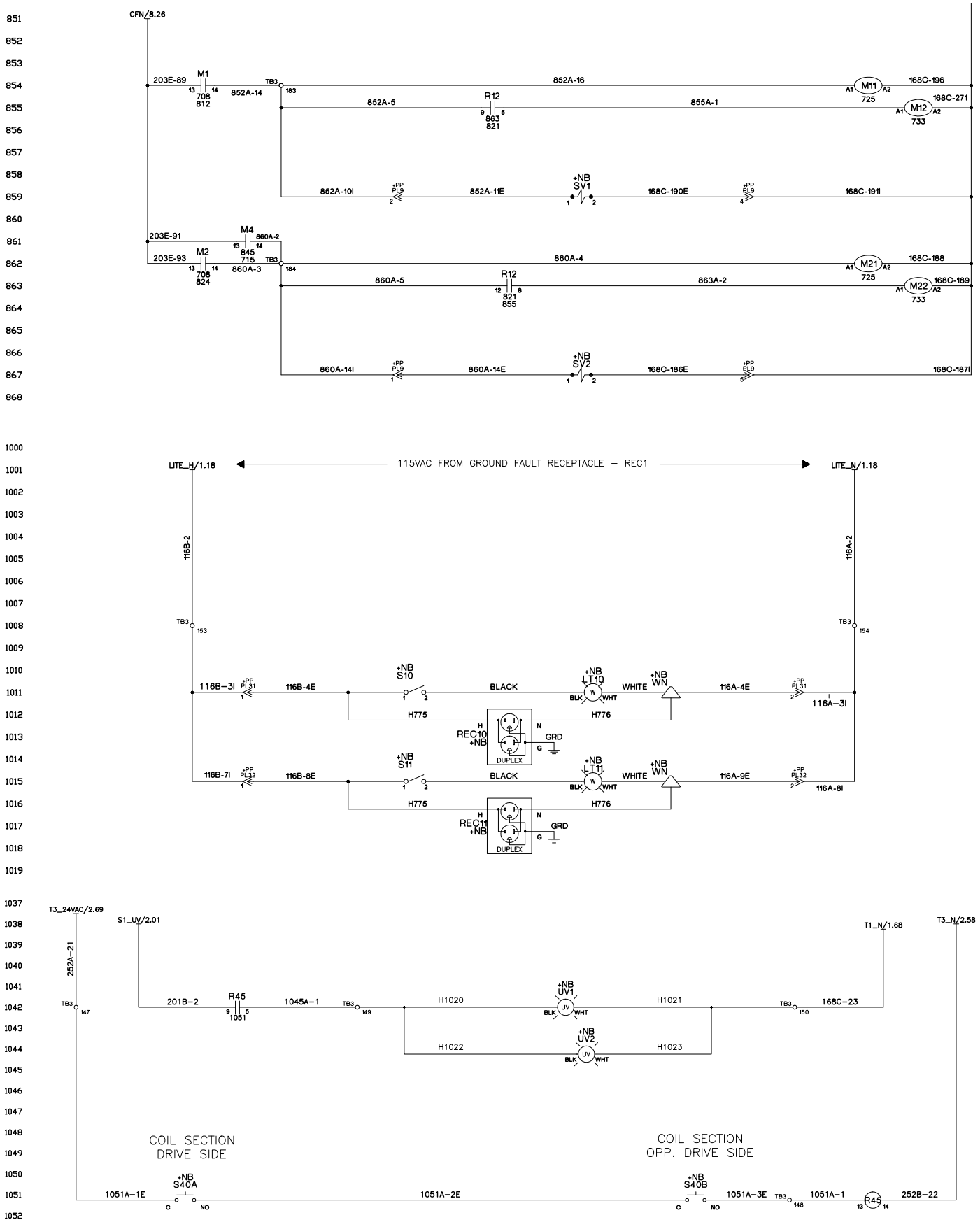


Figure 33: RPS with Variable Speed Inverter Compressors

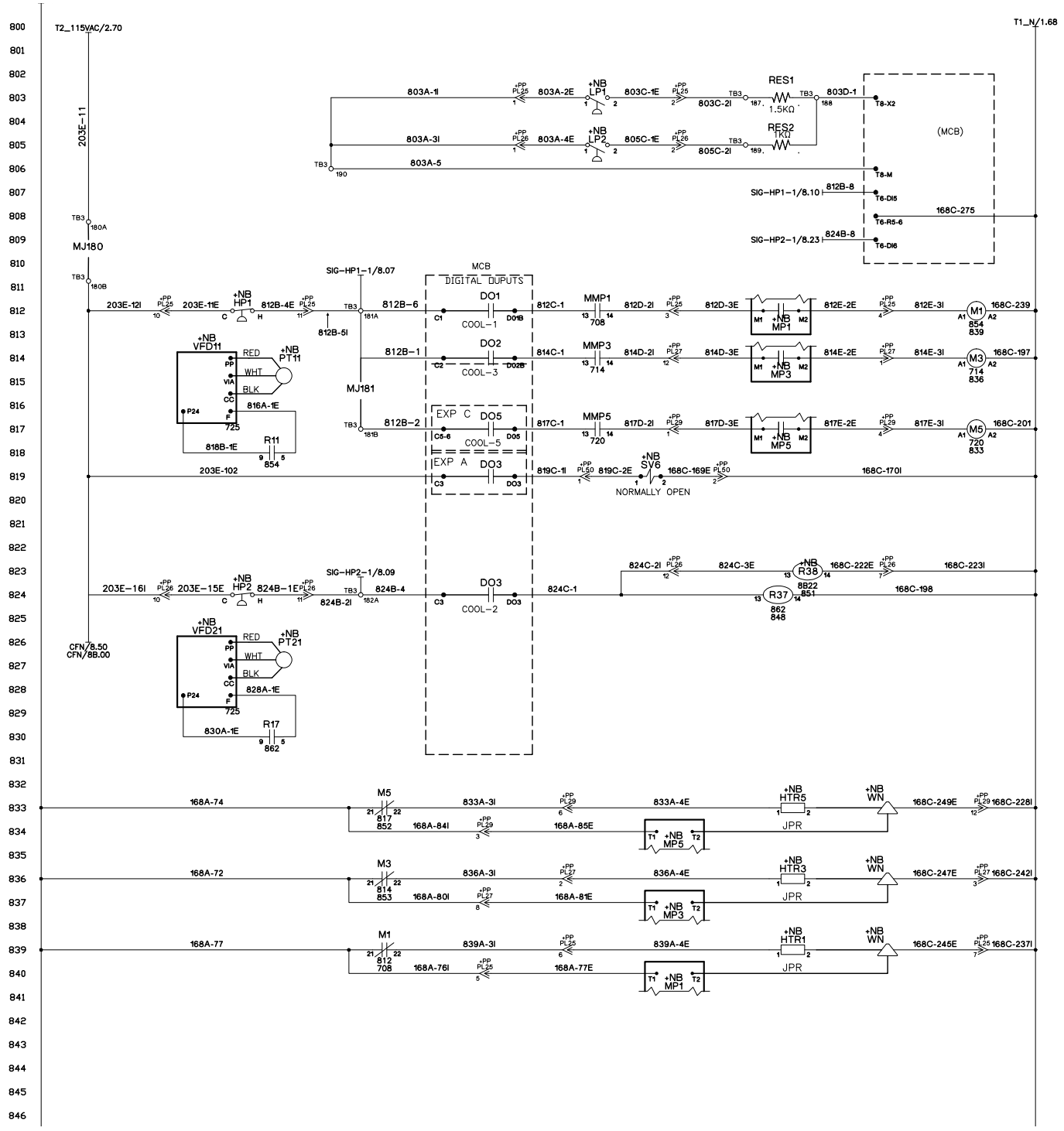


Figure 33 continued: RPS with Variable Speed Inverter Compressors

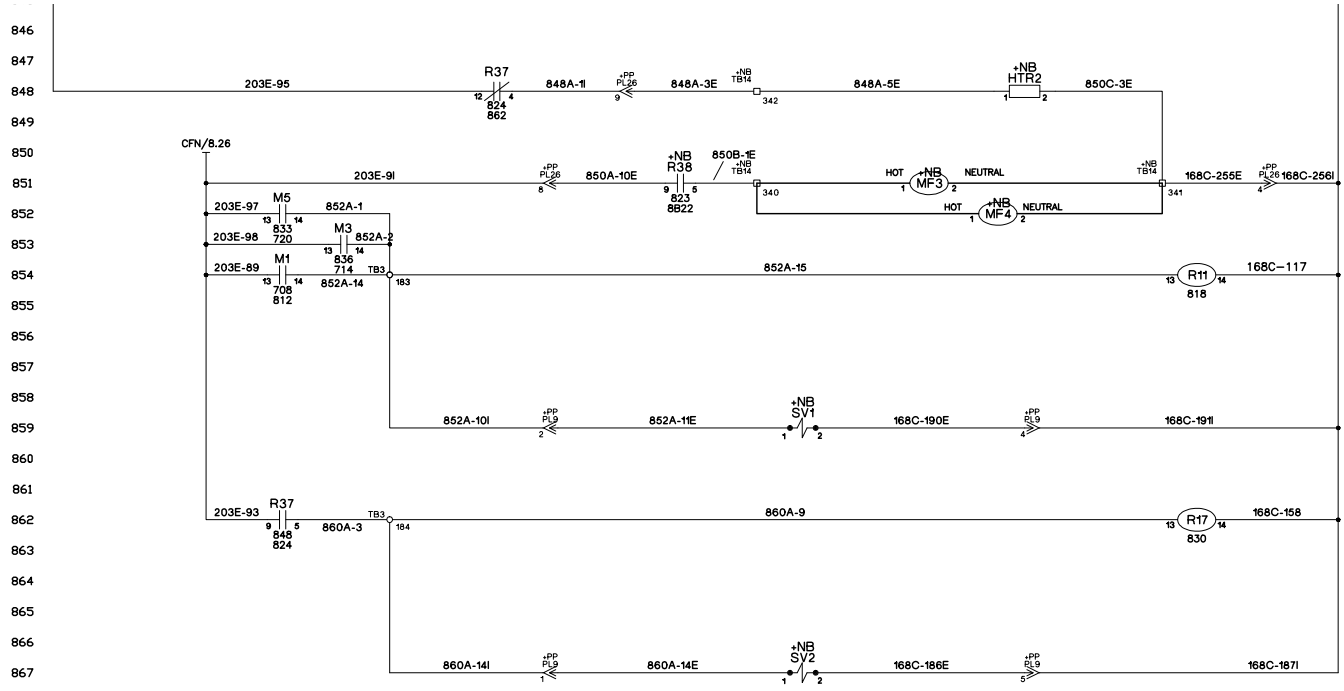


Figure 33 continued: RPS with Variable Speed Inverter Compressors

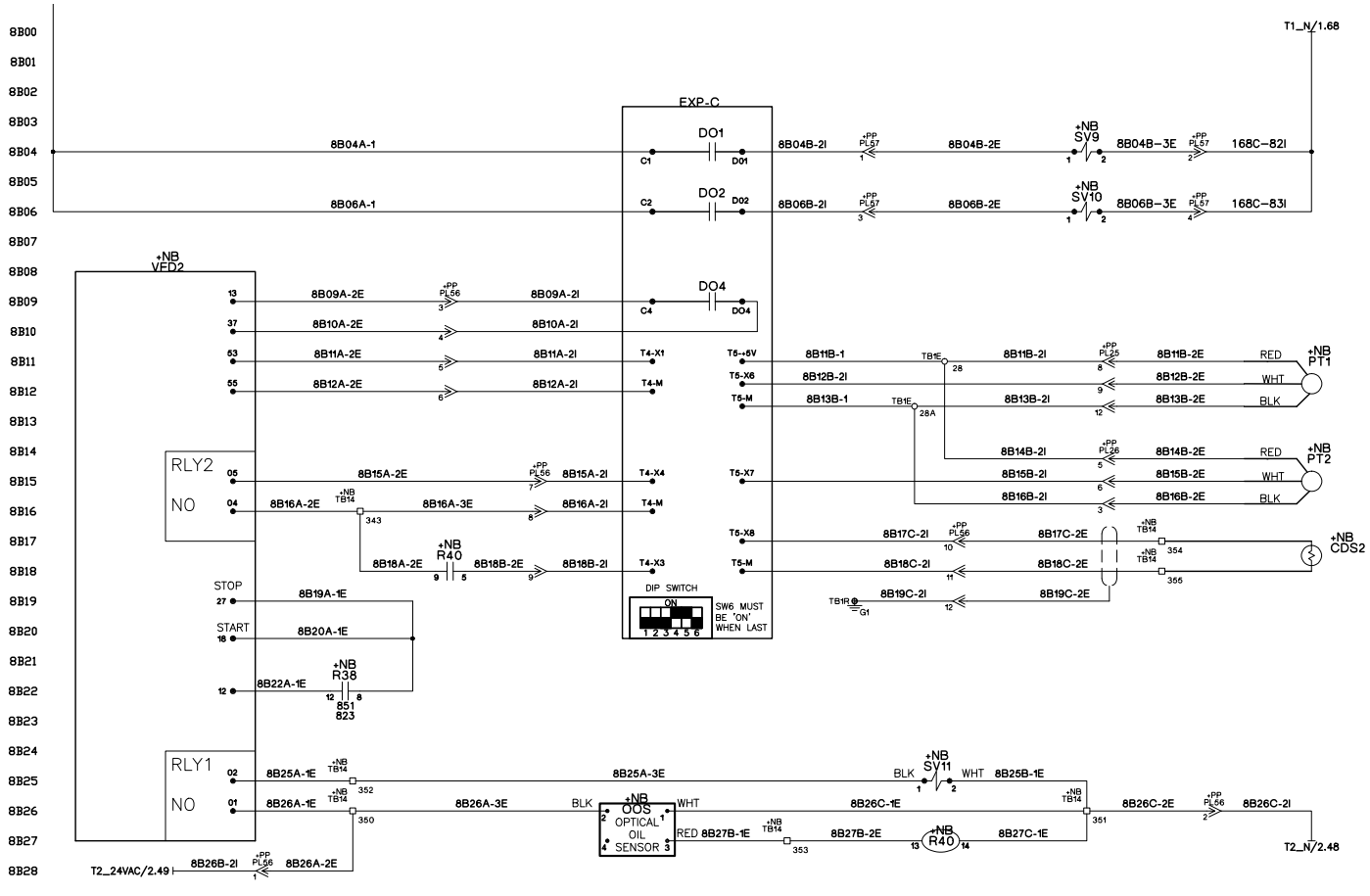
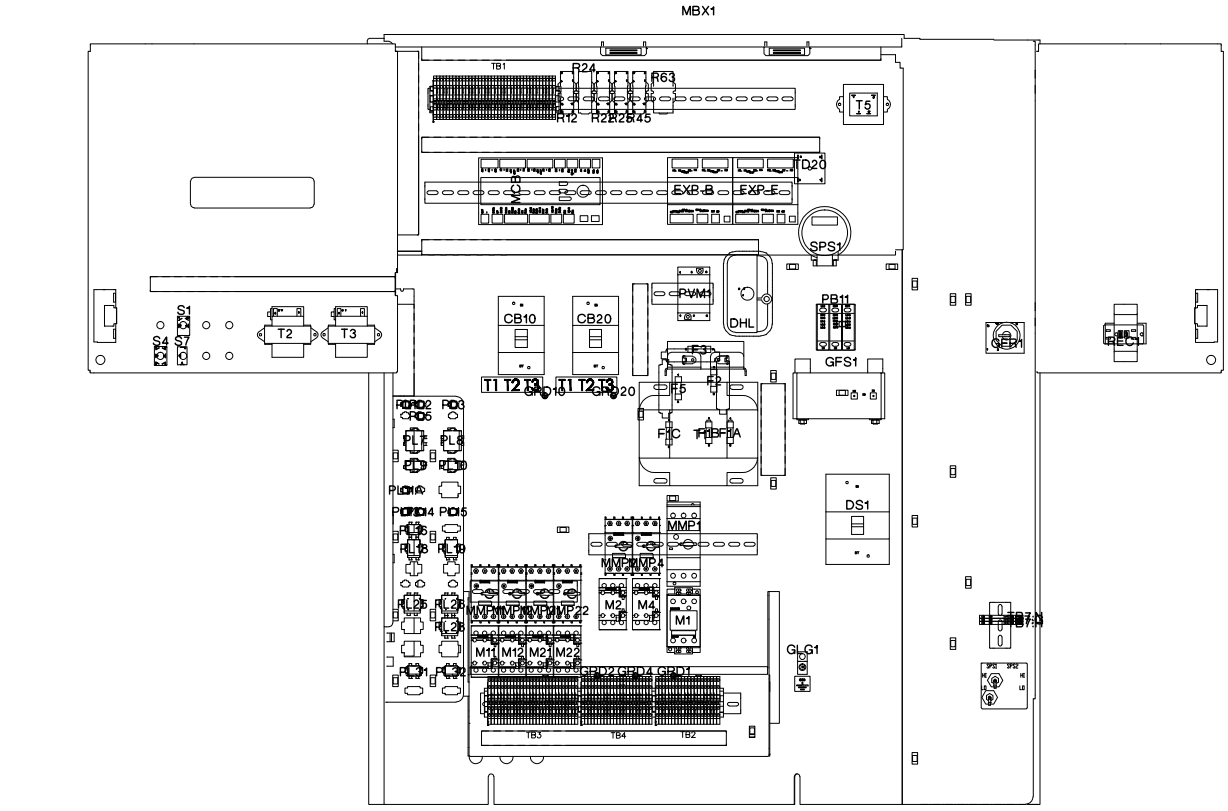
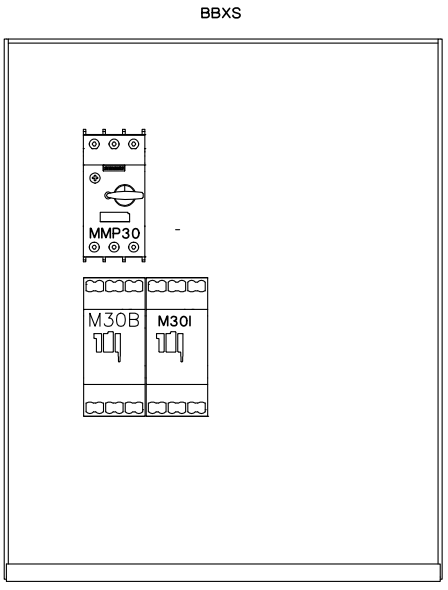


Figure 34: RPS Electrical Panel





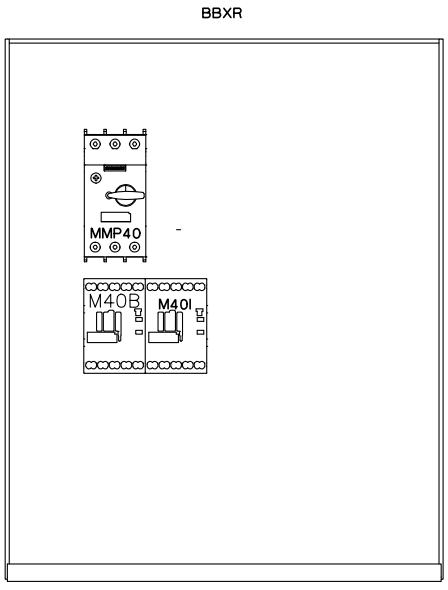
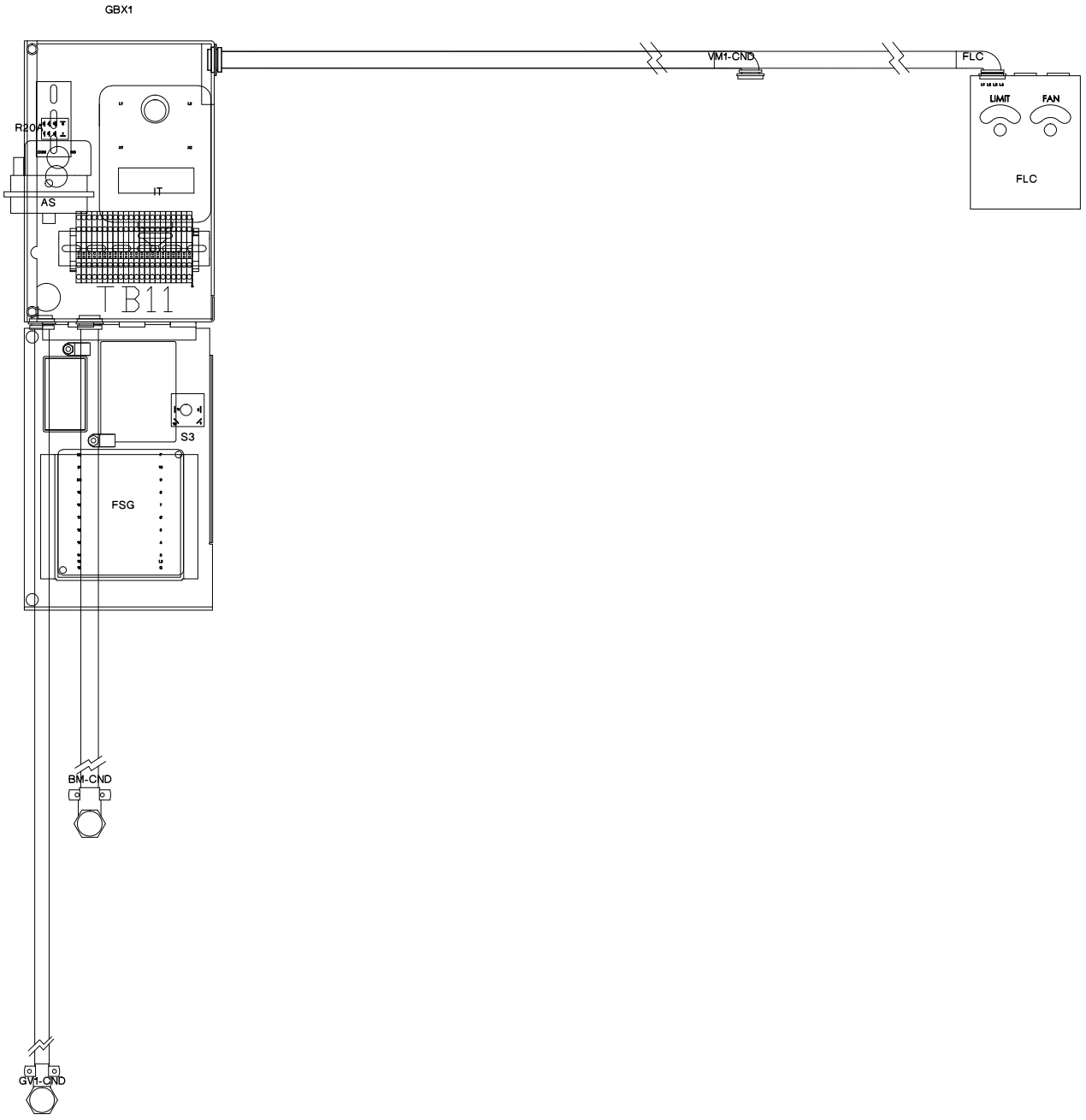


Figure 34 continued: RPS Electrical Panel



Typical Electrical Drawings - Maverick

Figure 35: Maverick Electrical Diagram

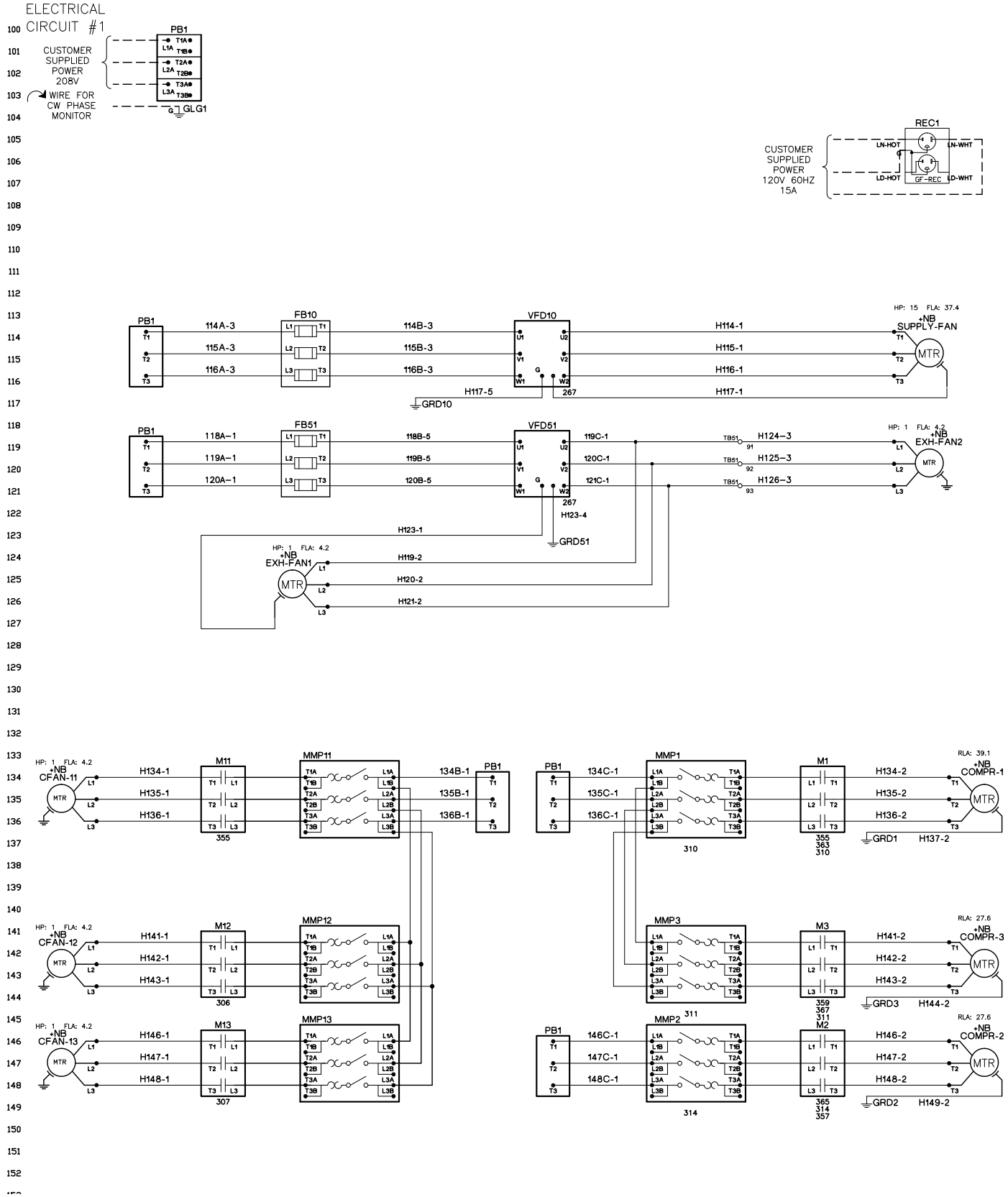


Figure 35 continued: Maverick Electrical Diagram

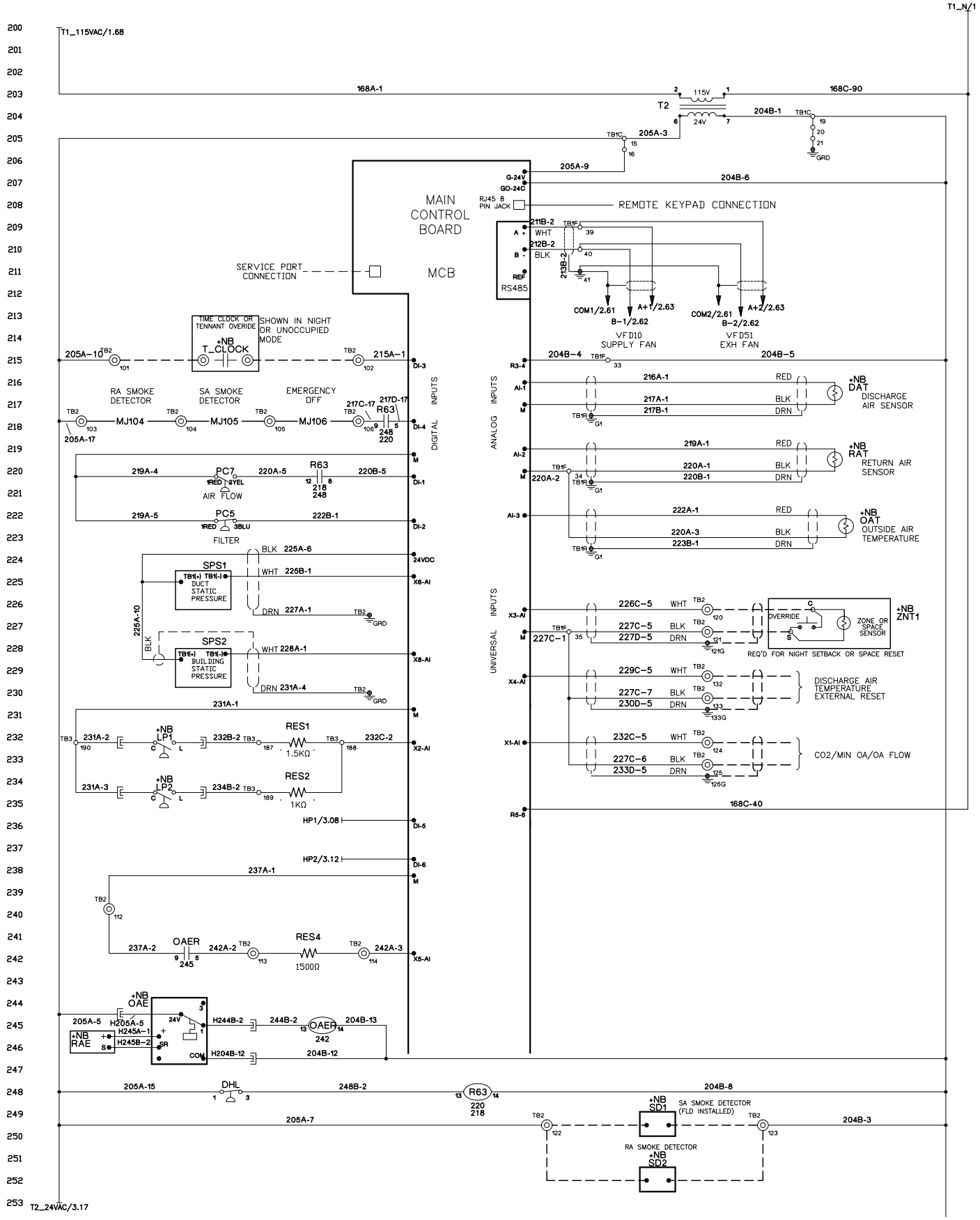


Figure 35 continued: Maverick Electrical Panel

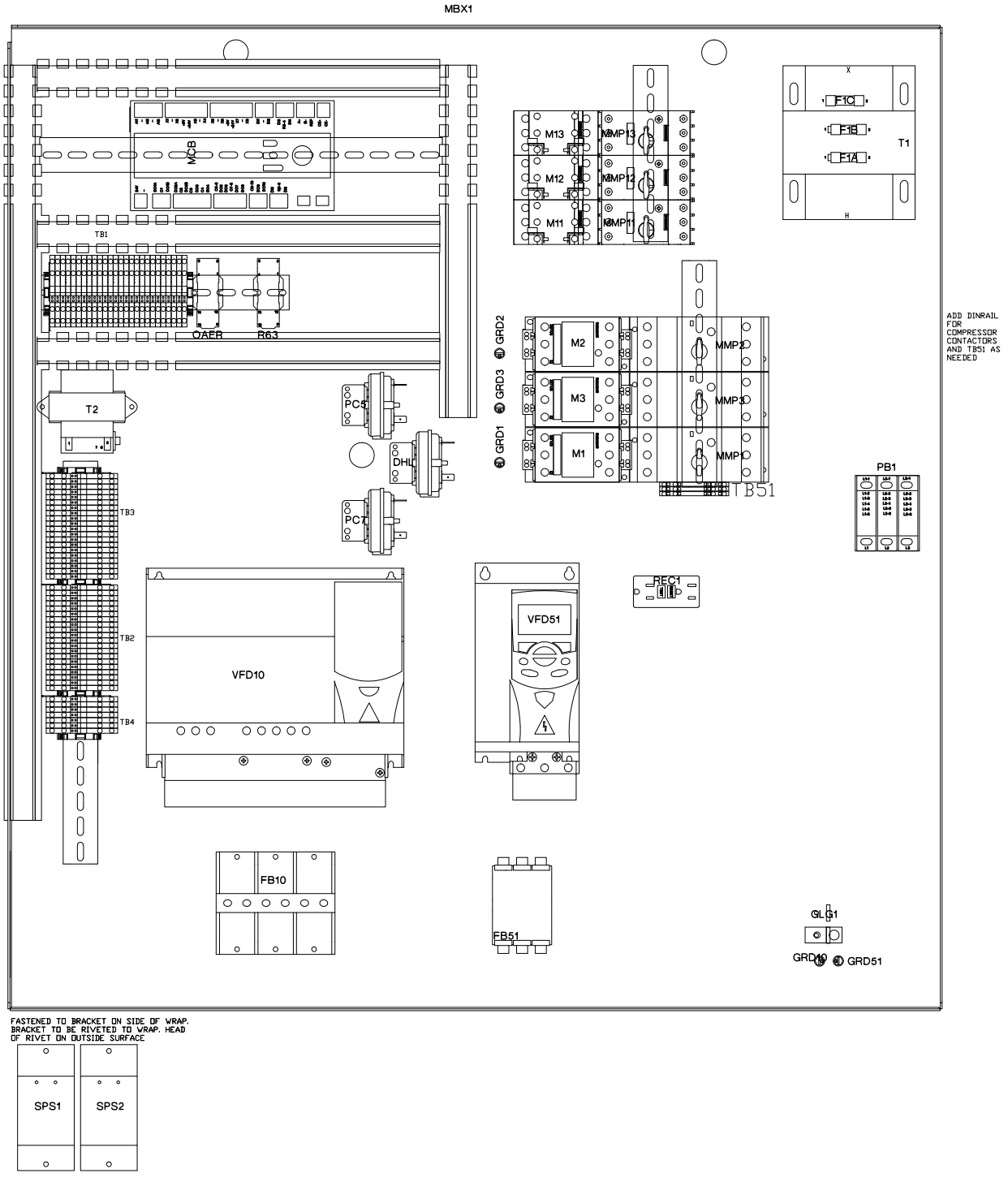


Figure 36 continued: Rebel Electrical Diagram

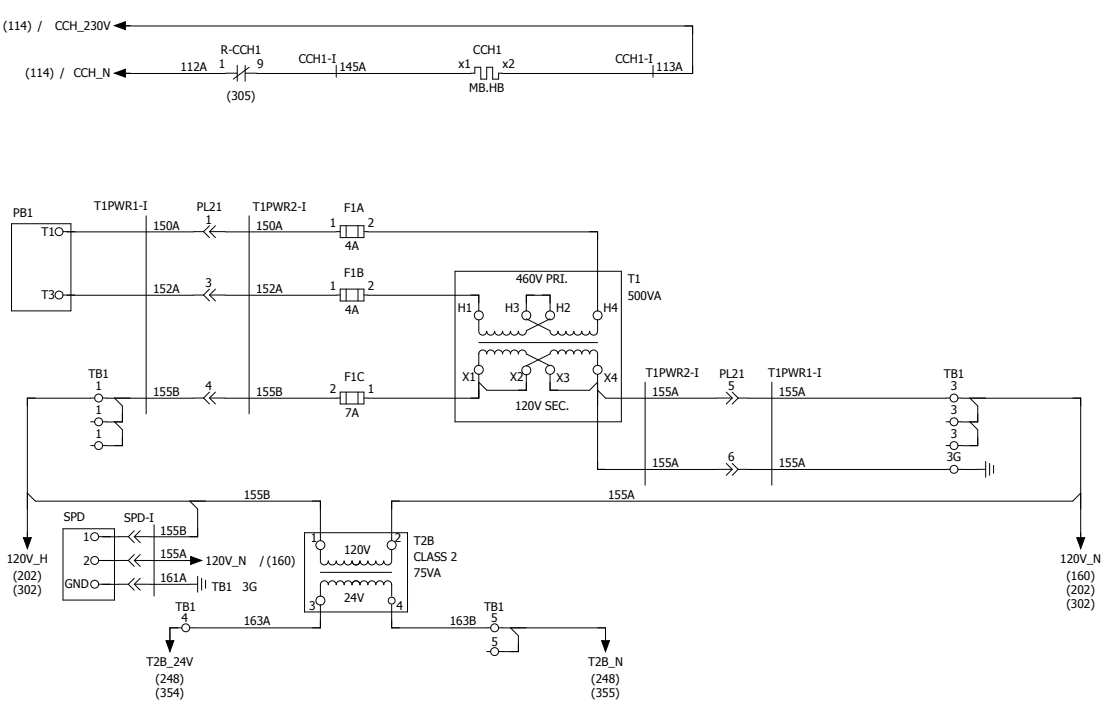


Figure 35 continued: Maverick Electrical Diagram

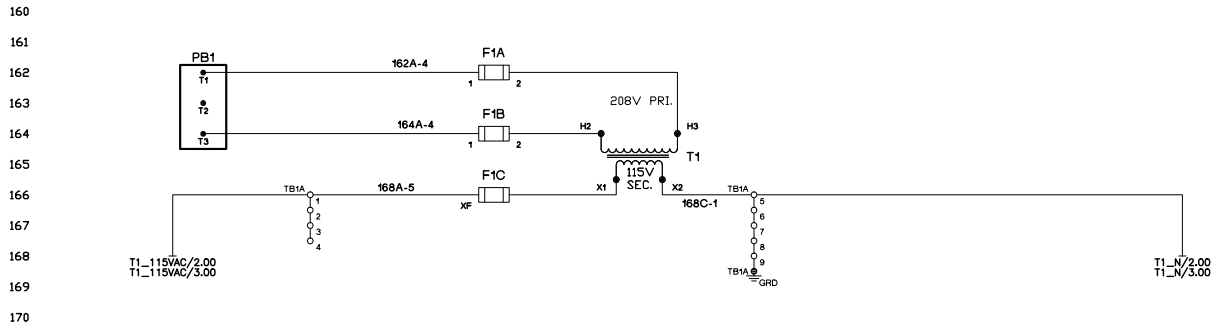
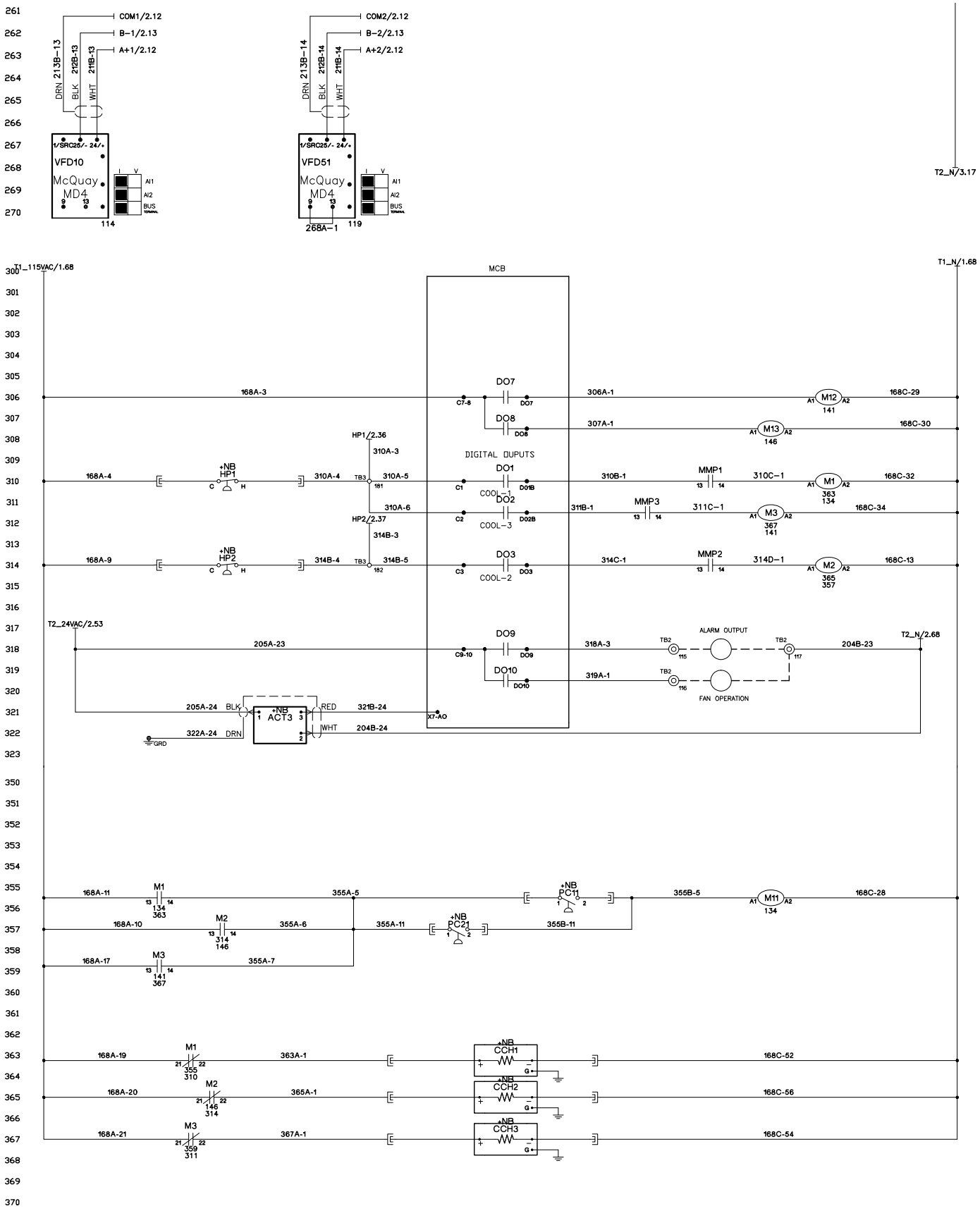


Figure 35 continued: Maverick Electrical Diagram



Typical Electrical Drawings - Rebel

Figure 36: Rebel Electrical Diagram

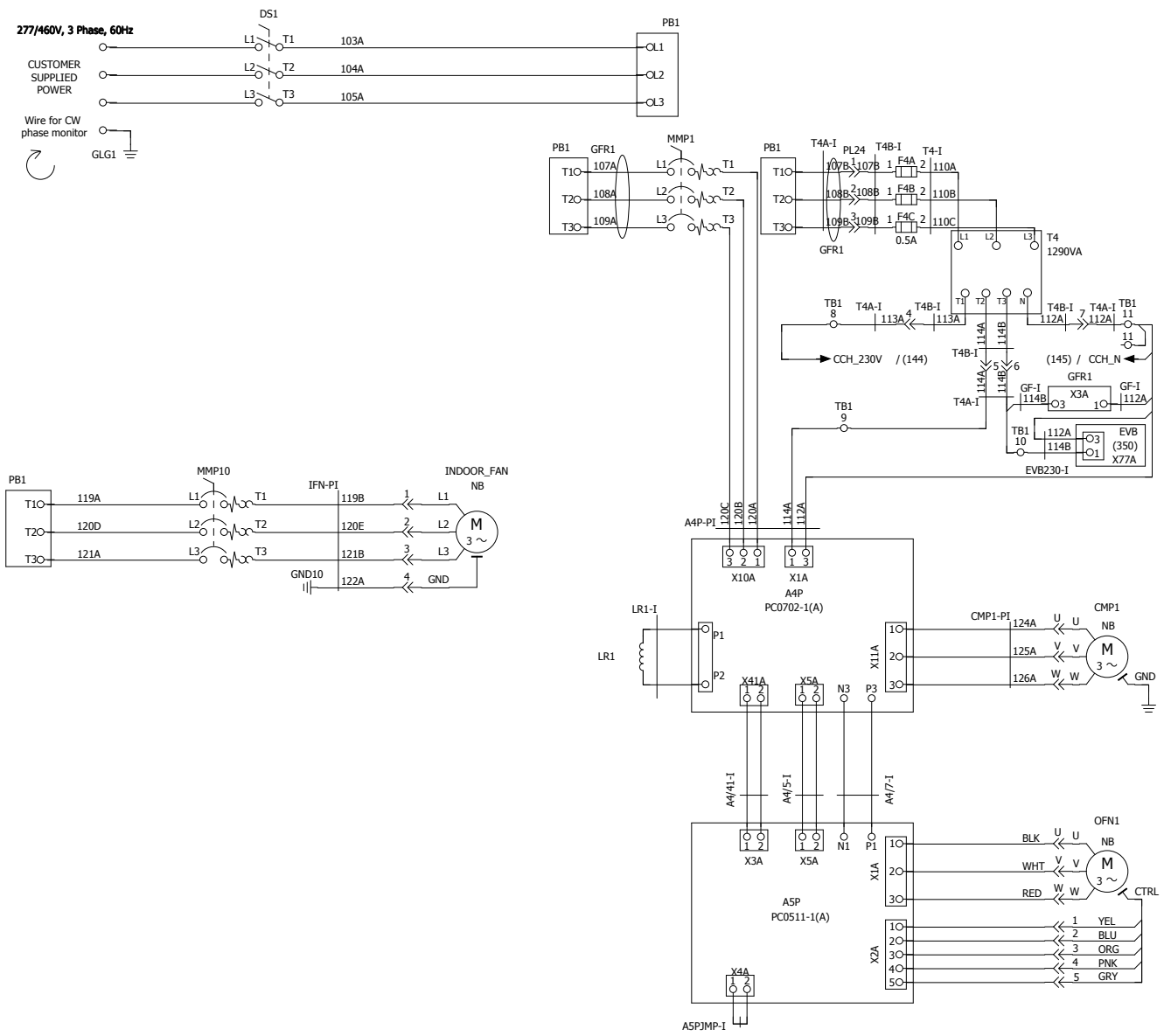


Figure 36 continued: Rebel Electrical Diagram

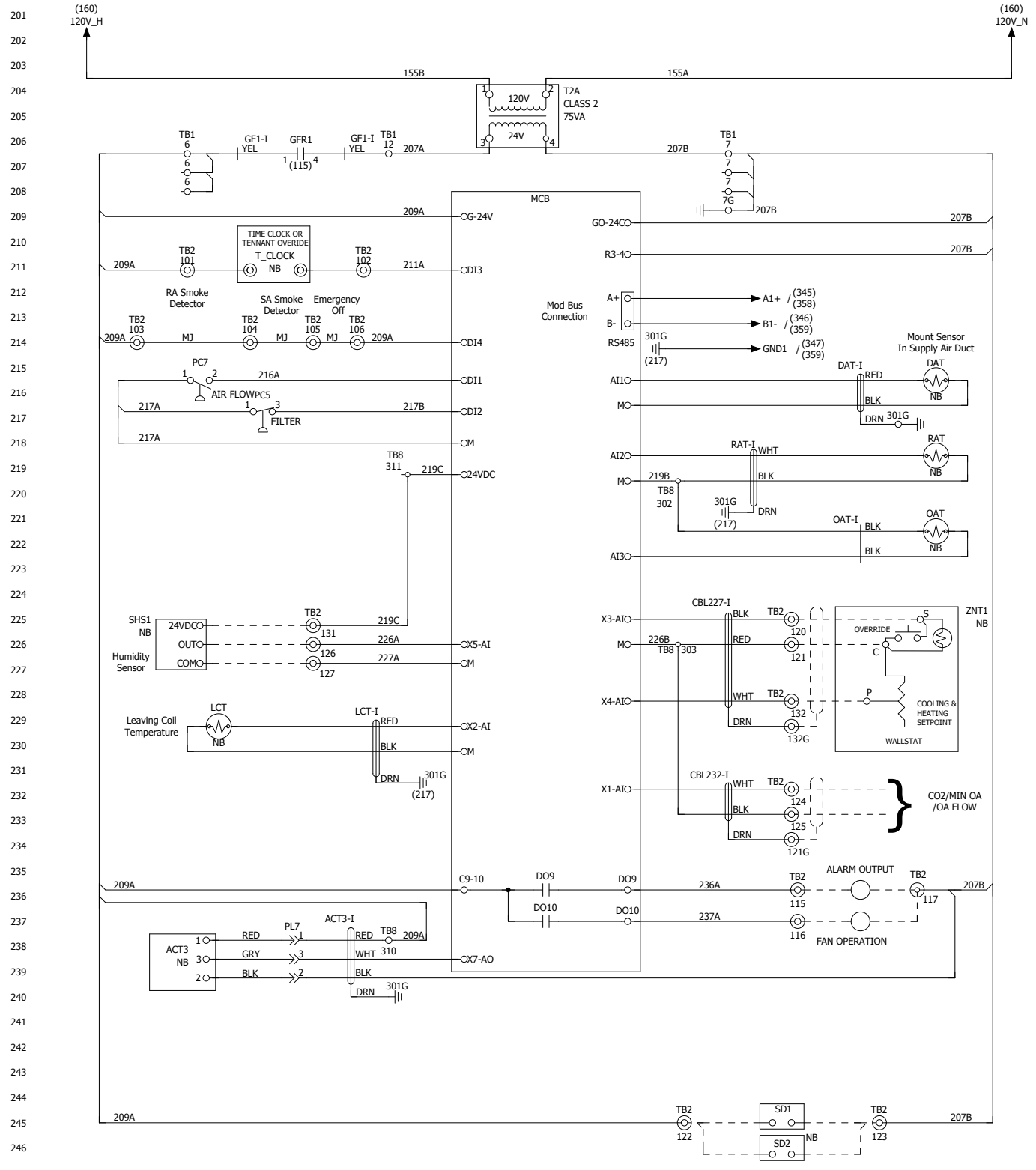


Figure 36 continued: Rebel Electrical Diagram

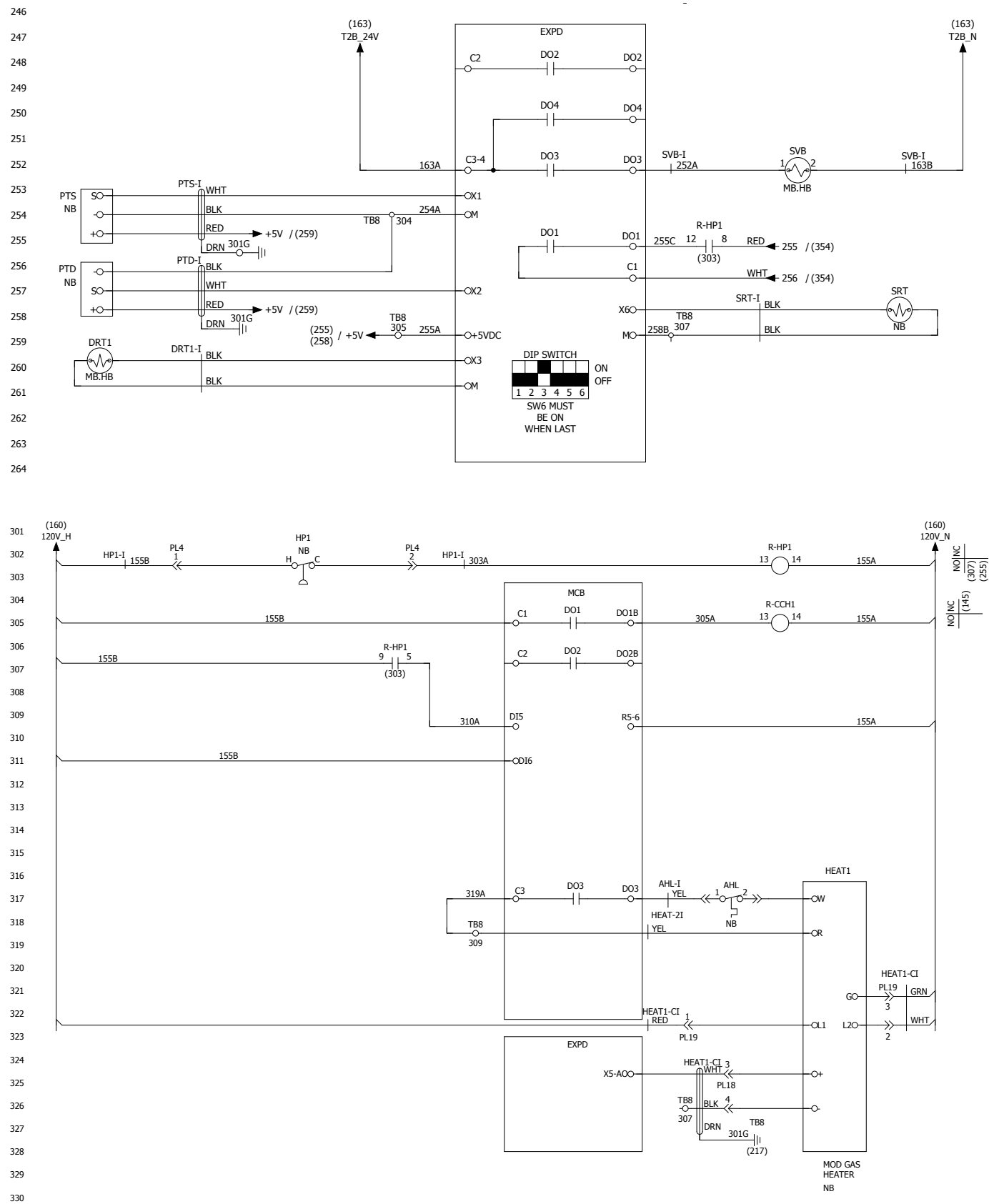
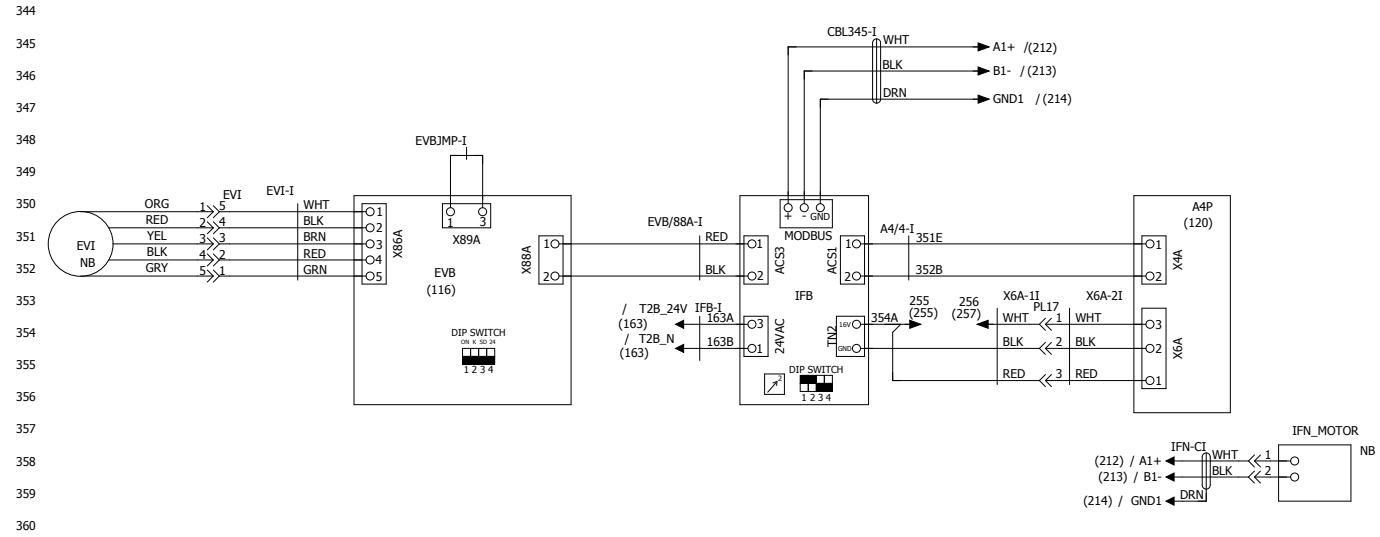
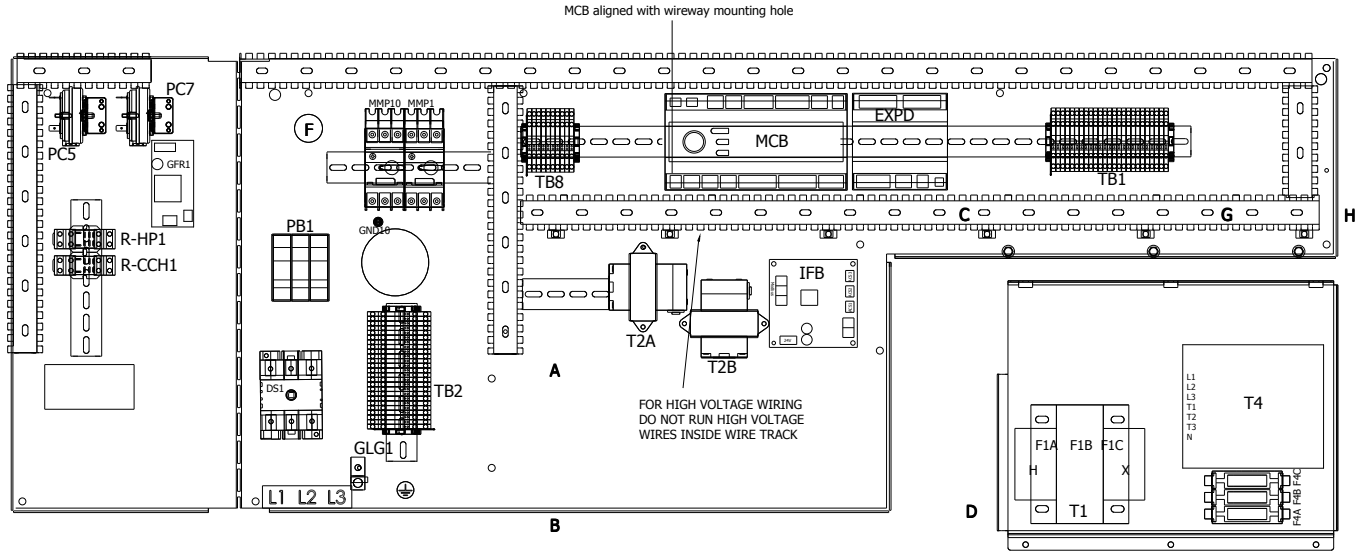
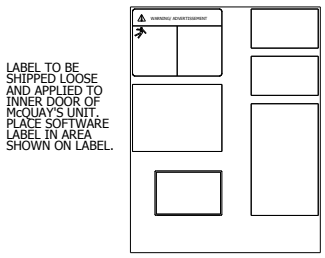


Figure 36 continued: Rebel Electrical Diagram

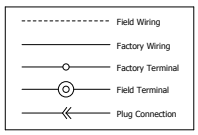






LABEL TO BE SHIPPED LOOSE AND APPLIED TO INNER DOOR OF McQUAY'S UNIT. PLACE SOFTWARE LABEL IN AREA SHOWN ON LABEL.

DANGER/WARNING LABELS TO BE SHIPPED LOOSE AND PLACED ON OUTSIDE OF UNIT DOOR.



ID:	Description:
4WV	Four Way Valve
A4P	Compressor 1 Inverter
A4PF	Compressor 1 Inverter Electrical Noise Filter
ASP	Outdoor Fan 1 Inverter
ASP+	Outdoor Fan 2 Inverter
ASPF	Outdoor Fan Electrical Noise Filter
ACT12	Actuator Motor, Heat Wheel
ACT3	Actuator Motor, Economizer
AHL	Auxiliary High Limit
CCH	Crankcase Heater
CHV1	Valve, Condenser Coil
Comm Mod.	Communication Module (BACnet, Lonworks, ...)
D3	DIII-NET Communication Gateway
DAT	Temperature Sensor, Discharge Air
DFT	Defrost Temperature Sensor
DHL	Duct Hi-limit, Switch
DRT1,3	Discharge Refrigerant Temperature Sensor
DS1	Disconnect Switch, Unit Power
DS2	Disconnect Switch, Supply Fan / Circuit 2
DS6	Disconnect Switch, Powered GFCI Receptacle
EVB	Expansion Valve Board
EVBF	Expansion Valve Board Electrical Noise Filter
EVI	Indoor Expansion Valve
EVO	Outdoor Expansion Valve
EXPB,D	Expansion Control Board
F1A,B	Fuse, Control Circuit Transformer (T1), Primary
F1C,D	Fuse, Control Circuit Transformer (T1), Secondary
F4A,B,C	Fuse, 460V 3-Phase Transformer (T4), Primary
F6C	Fuse, Powered GFCI Transformer (T6), Secondary
GFR1	Ground Fault Relay
HEAT1	Heater Module
HL	Hi-Limit Switch, Gas Heat
HP1,3	Hi-Pressure Switch, Refrigeration Circuits 1, 3
IFB	Interface Board
IFBF	Interface Board Electrical Noise Filter
IRT	Indoor Refrigerant Temperature Sensor
LCT	Temperature Sensor, Leaving Coil
LR1	Compressor Line Reactor
M1F	Compressor 1 Electrical Noise Filter
M3	Contactor, Compressor 3
M60	Contactor, Constant Speed Recovery Wheel
MCB	Main Control Board
MJ	Mechanical Jumper
MMP1	Manual Motor Protector, A4P Board
MMP10	Manual Motor Protector, Supply Fan
MMP3	Manual Motor Protector, Compressor 3

ID:	Description:
MMP51	Manual Motor Protector, Exhaust Fan
MMP60	Manual Motor Protector, Energy Recovery Wheel
MPB1	Contactor, Circuit 1 Dual Supply
OAE	Enthalpy Sensor, Outside Air
OAER	Relay, Outside Air Enthalpy
OAT	Temperature Sensor, Outside Air
OF1F	Outdoor Fan Electrical Noise Filter 1
OF2F	Outdoor Fan Electrical Noise Filter 2
ORT	Outdoor Refrigerant Temperature Sensor
PB1	Power Block, Power Distribution
PB2	Power Block 2,Circuit 2 Dual Supply
PB1F	Power Block Electrical Noise Filter
PC5	Pressure Control, Dirty Filter Switch
PC7	Pressure Control, Proof Airflow Switch
PTD	Discharge Refrigerant Pressure Sensor
PTS	Suction Refrigerant Pressure Sensor
PVM1	Phase Voltage Monitor
R63	Relay, Duct High Limit Switch
RAE	Enthalpy Sensor, Return Air
RAT	Temperature Sensor, Return Air
R-CCH1	Crankcase Heater Relay
REC1	Receptacle, GFCI
RES3,4	Resistor
RHB1	Reheat Board, Hot Gas
R-HP1	High Pressure Compressor 1 Relay
RHV1	Valve, Reheat Coil
SD1/SD2	Smoke Detector, Supply Air/Return Air
SHS1	Space Humidity Sensor
SPD	Surge Protective Device
SPS1	Static Pressure Sensor, Duct
SPS2	Static Pressure Sensor, Building
SRT	Suction Refrigerant Temperature Sensor
SVB	Refrigerant Bypass Solenoid Valve
SVR	Refrigerant Receiver Solenoid Valve
T1	Transformer, Main Control
T12	575/460V Primary Power Transformer
T1F	Main Transformer Electrical Noise Filter
T2A,B	Transformer, Control Input (115/24VAC)
T4	Transformer, 230V Single Phase (460/397VAC)
T6	Transformer, Powered GFCI Receptacle (Line/115VAC)
T7	Transformer, Reheat Control Board (115/24VAC)
TB1	Terminal Block, Internal Power Distribution
TB2	Terminal Block, Field -24V
TB8	Terminal Block, Internal Signal Distribution
VFD60	Variable Frequency Drive, Energy Recovery Wheel

Figure 36 continued: Rebel Electrical Diagram

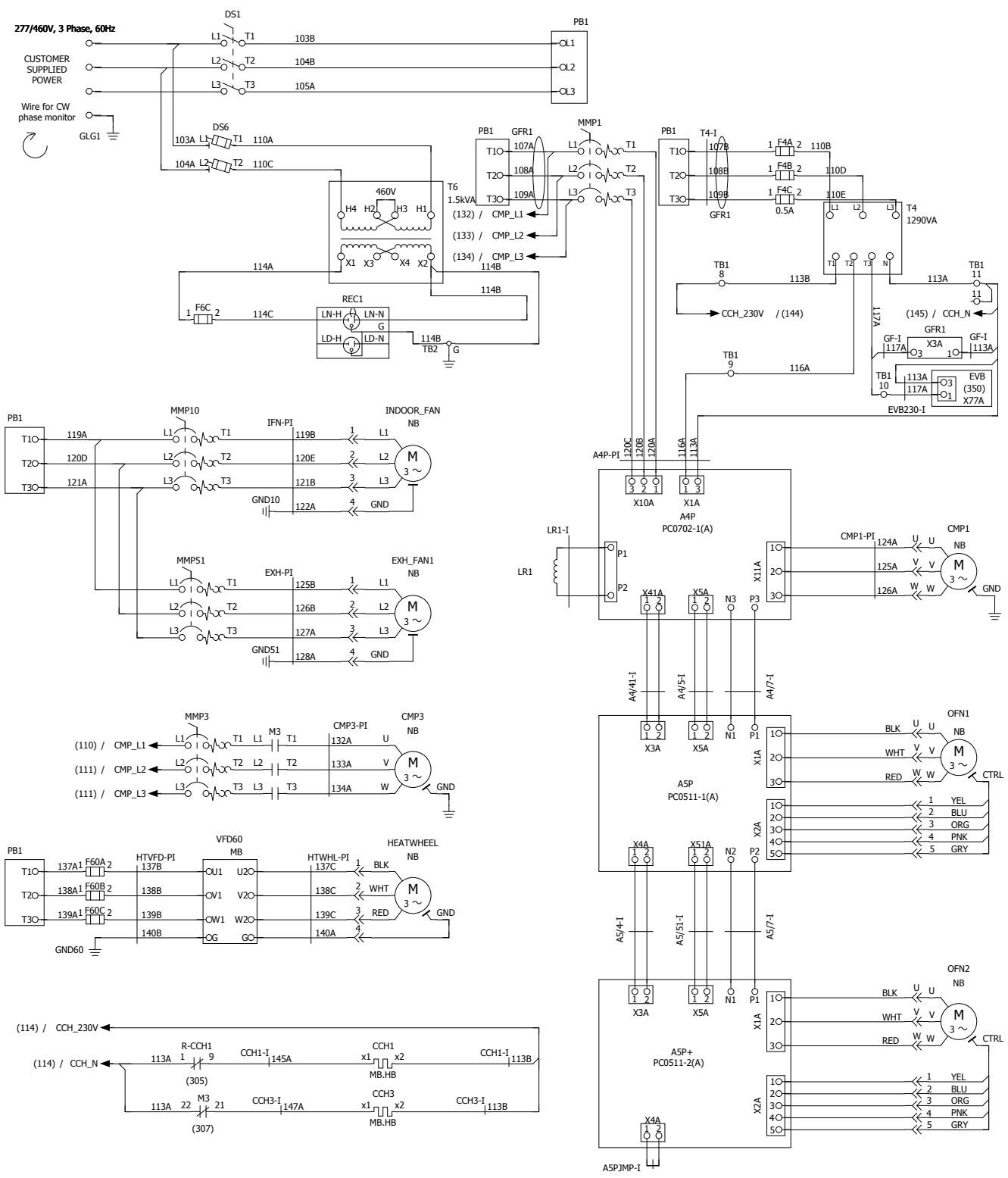


Figure 36 continued: Rebel Electrical Diagram

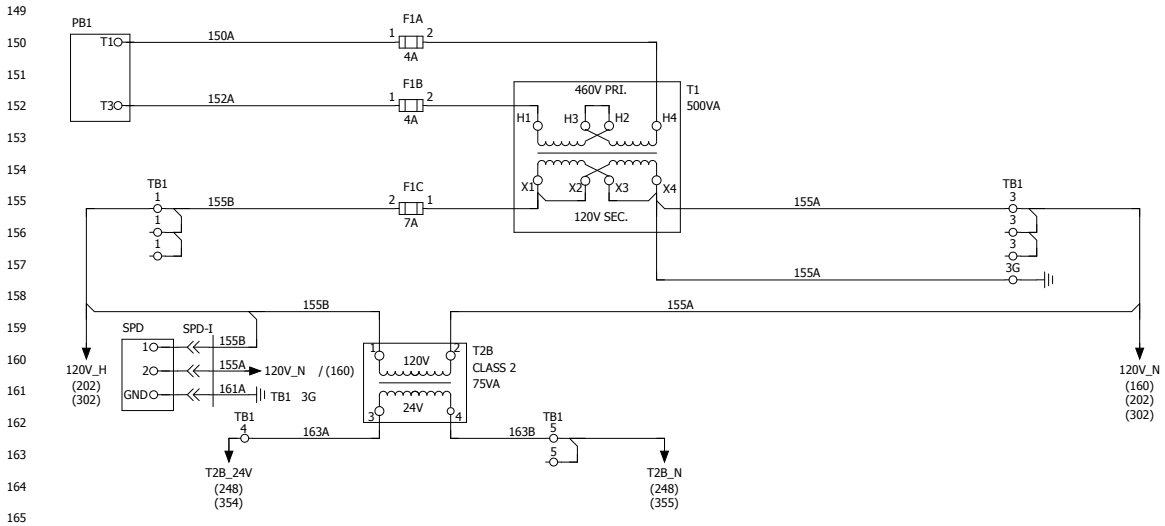


Figure 36 continued: Rebel Electrical Diagram

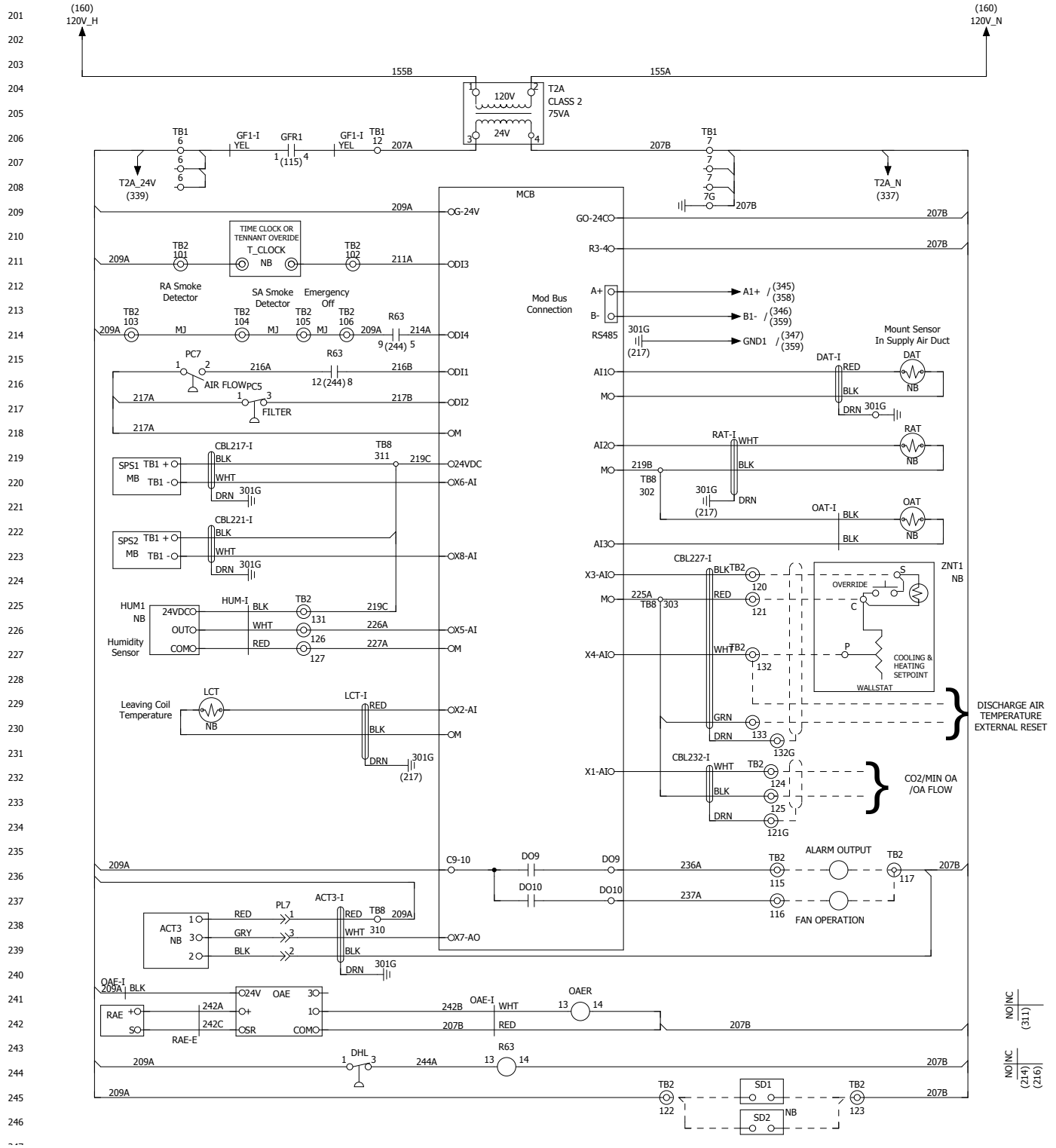


Figure 36 continued: Rebel Electrical Diagram

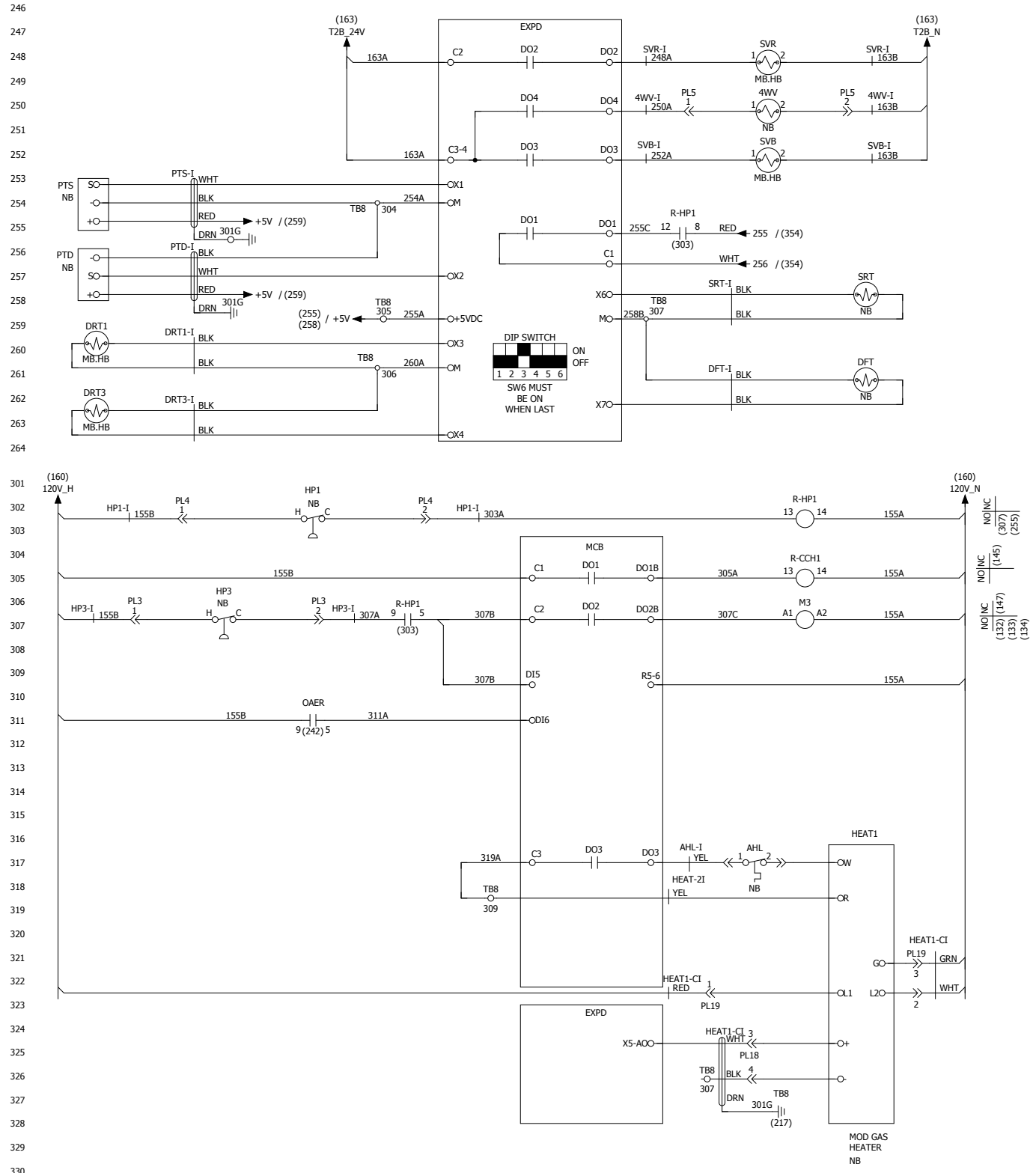


Figure 36 continued: Rebel Electrical Diagram

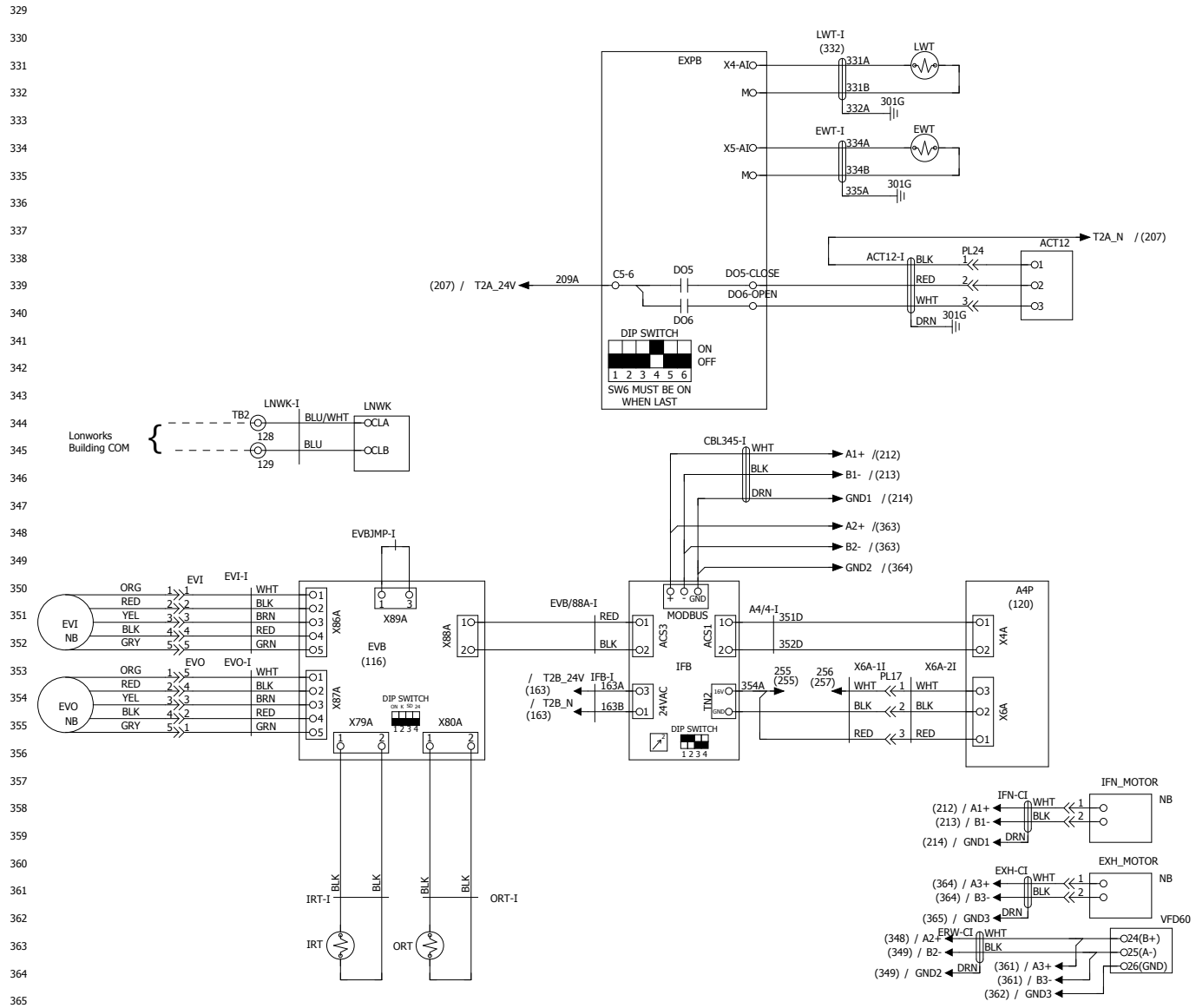
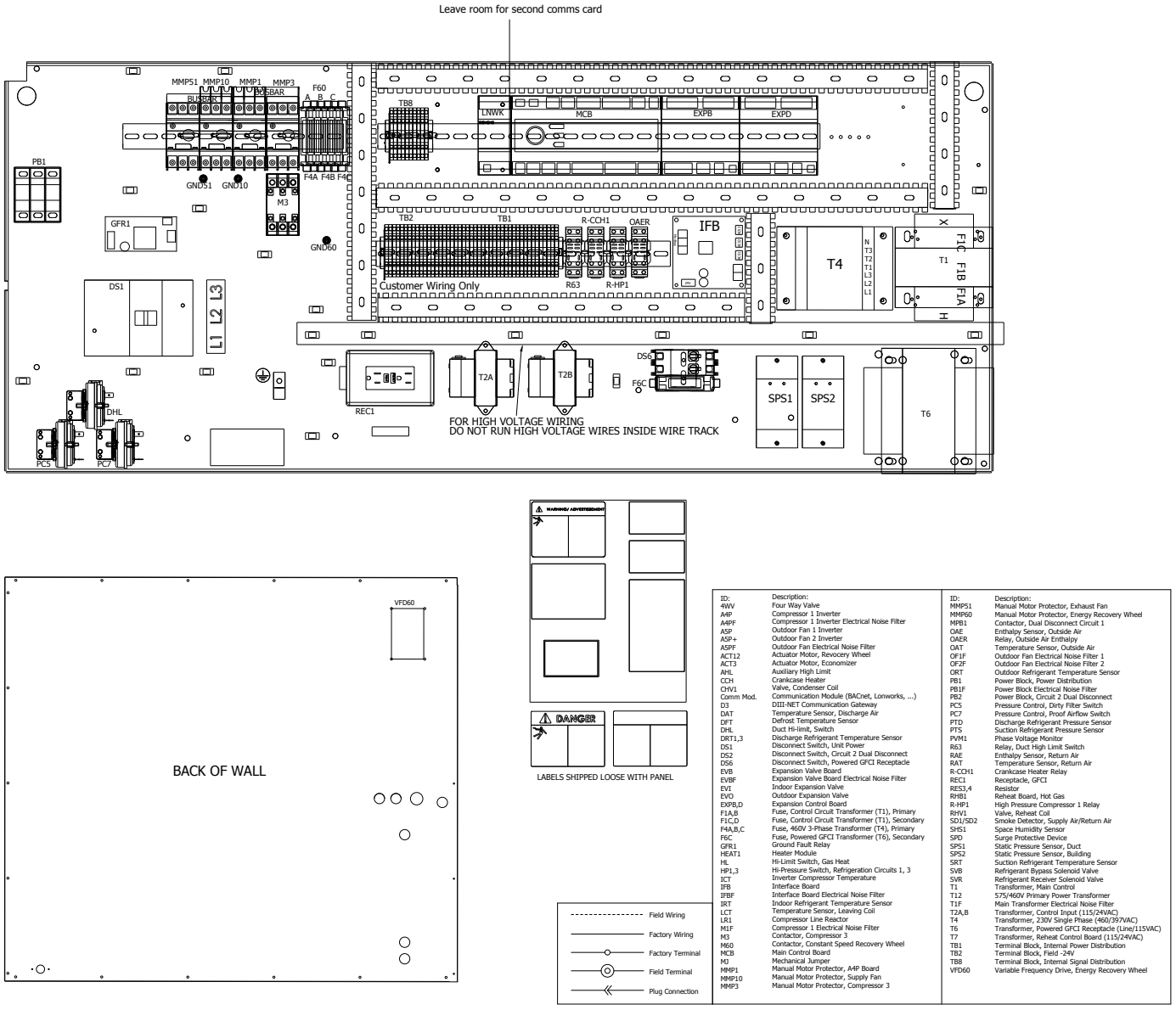


Figure 36 continued: Rebel Electrical Diagram



ID:	Description:
4WV	Four Way Valve
A4P	Compressor 1 Inverter
A4PF	Compressor 1 Inverter Electrical Noise Filter
ASP	Outdoor Fan 1 Inverter
ASP+	Outdoor Fan 2 Inverter
ASPF	Outdoor Fan Electrical Noise Filter
ACT12	Actuator Motor, Revocery Wheel
ACT3	Actuator Motor, Economizer
AHL	Auxiliary High Limit
CCH	Crankcase Heater
CHV1	Valve, Condenser Coil
Comm Mod.	Communication Module (BACnet, Lonworks, ...)
D3	DIII-NET Communication Gateway
DAT	Temperature Sensor, Discharge Air
DFT	Defrost Temperature Sensor
DHL	Duct Hi-limit, Switch
DRT1,3	Discharge Refrigerant Temperature Sensor
DS1	Disconnect Switch, Unit Power
DS2	Disconnect Switch, Circuit 2 Dual Disconnect
DS6	Disconnect Switch, Powered GFCI Receptacle
EVB	Expansion Valve Board
EVBF	Expansion Valve Board Electrical Noise Filter
EVI	Indoor Expansion Valve
EVO	Outdoor Expansion Valve
EXPB,D	Expansion Control Board
F1A,B	Fuse, Control Circuit Transformer (T1), Primary
F1C,D	Fuse, Control Circuit Transformer (T1), Secondary
F4A,B,C	Fuse, 460V 3-Phase Transformer (T4), Primary
F6C	Fuse, Powered GFCI Transformer (T6), Secondary
GFR1	Ground Fault Relay
HEAT1	Heater Module
HL	Hi-Limit Switch, Gas Heat
HP1,3	Hi-Pressure Switch, Refrigeration Circuits 1, 3
ICT	Inverter Compressor Temperature
IFB	Interface Board
IFBF	Interface Board Electrical Noise Filter
IRT	Indoor Refrigerant Temperature Sensor
LCT	Temperature Sensor, Leaving Coil
LR1	Compressor Line Reactor
M1F	Compressor 1 Electrical Noise Filter
M3	Contactor, Compressor 3
M60	Contactor, Constant Speed Recovery Wheel
MCB	Main Control Board
MJ	Mechanical Jumper
MMP1	Manual Motor Protector, A4P Board
MMP10	Manual Motor Protector, Supply Fan
MMP3	Manual Motor Protector, Compressor 3

ID:	Description:
MMP51	Manual Motor Protector, Exhaust Fan
MMP60	Manual Motor Protector, Energy Recovery Wheel
MPB1	Contactor, Dual Disconnect Circuit 1
OAE	Enthalpy Sensor, Outside Air
OAER	Relay, Outside Air Enthalpy
OAT	Temperature Sensor, Outside Air
OF1F	Outdoor Fan Electrical Noise Filter 1
OF2F	Outdoor Fan Electrical Noise Filter 2
ORT	Outdoor Refrigerant Temperature Sensor
PB1	Power Block, Power Distribution
PB1F	Power Block Electrical Noise Filter
PB2	Power Block, Circuit 2 Dual Disconnect
PC5	Pressure Control, Dirty Filter Switch
PC7	Pressure Control, Proof Airflow Switch
PTD	Discharge Refrigerant Pressure Sensor
PTS	Suction Refrigerant Pressure Sensor
PVM1	Phase Voltage Monitor
R63	Relay, Duct High Limit Switch
RAE	Enthalpy Sensor, Return Air
RAT	Temperature Sensor, Return Air
R-CCH1	Crankcase Heater Relay
REC1	Receptacle, GFCI
RES3,4	Resistor
RHB1	Reheat Board, Hot Gas
R-HP1	High Pressure Compressor 1 Relay
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SD1/SD2	Smoke Detector, Supply Air/Return Air
SHS1	Space Humidity Sensor
SPD	Surge Protective Device
SPS1	Static Pressure Sensor, Duct
SPS2	Static Pressure Sensor, Building
SRT	Suction Refrigerant Temperature Sensor
SVB	Refrigerant Bypass Solenoid Valve
SVR	Refrigerant Receiver Solenoid Valve
T1	Transformer, Main Control
T12	575/460V Primary Power Transformer
T1F	Main Transformer Electrical Noise Filter
T2A,B	Transformer, Control Input (115/24VAC)
T4	Transformer, 230V Single Phase (460/397VAC)
T6	Transformer, Powered GFCI Receptacle (Line/115VAC)
T7	Transformer, Reheat Control Board (115/24VAC)
TB1	Terminal Block, Internal Power Distribution
TB2	Terminal Block, Field -24V
TB8	Terminal Block, Internal Signal Distribution
VFD60	Variable Frequency Drive, Energy Recovery Wheel

Figure 37: Rebel (New Style 16 to 28 Ton) Electrical Diagram

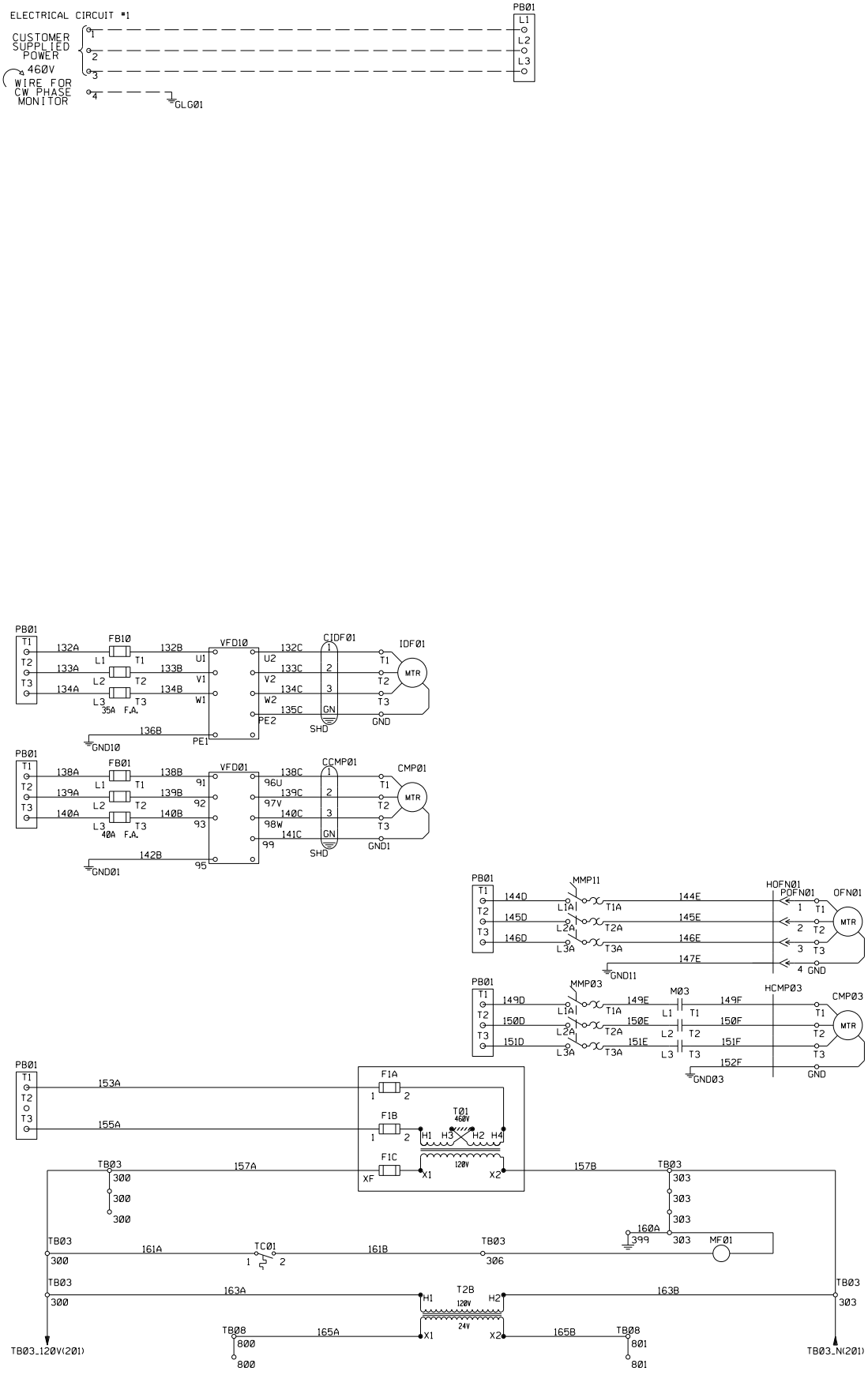


***Figure 37 continued:** Rebel (New Style) Electrical Diagram*

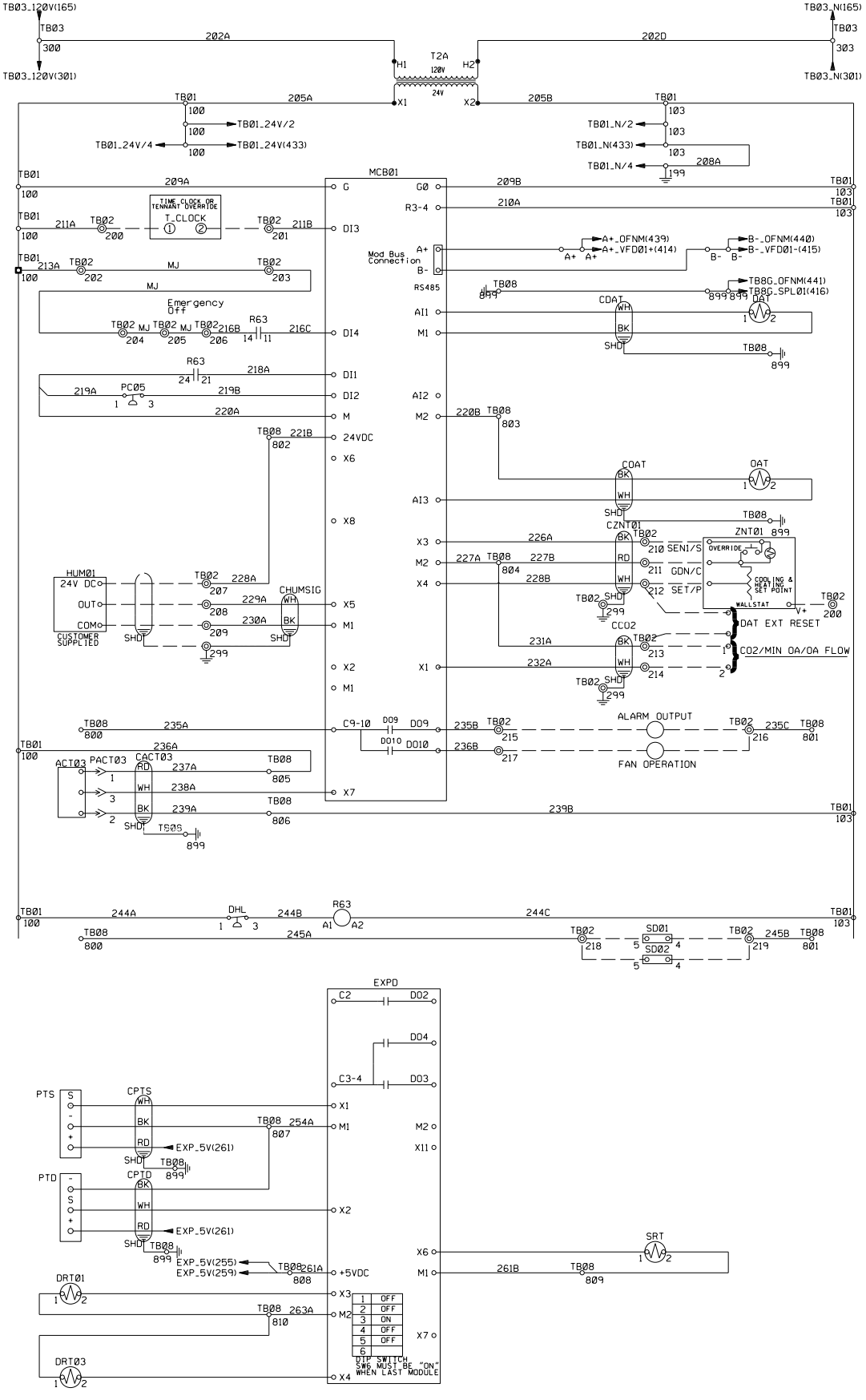


***Figure 37 continued:** Rebel (New Style) Electrical Diagram*

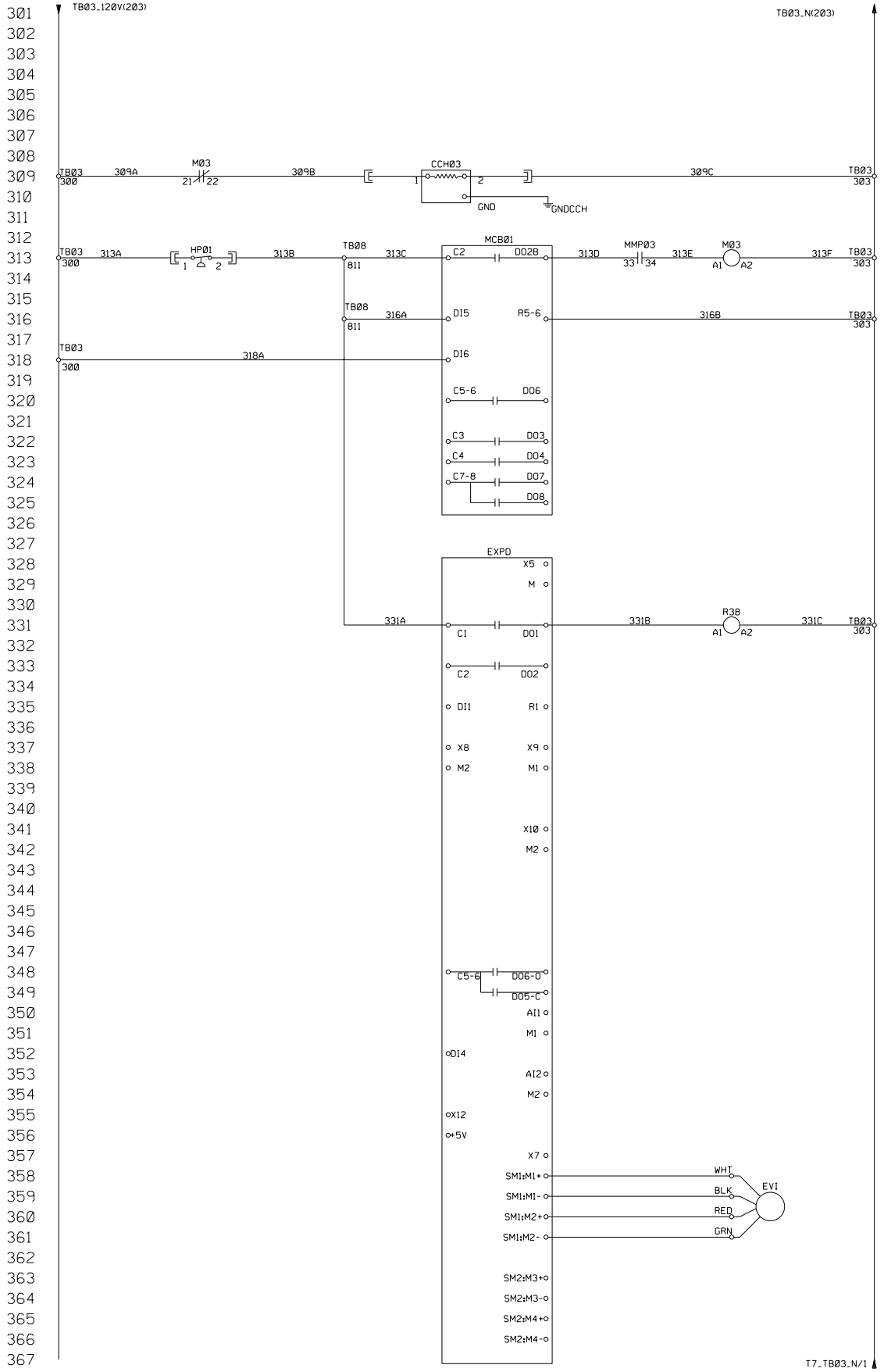


***Figure 37 continued:** Rebel (New Style) Electrical Diagram*

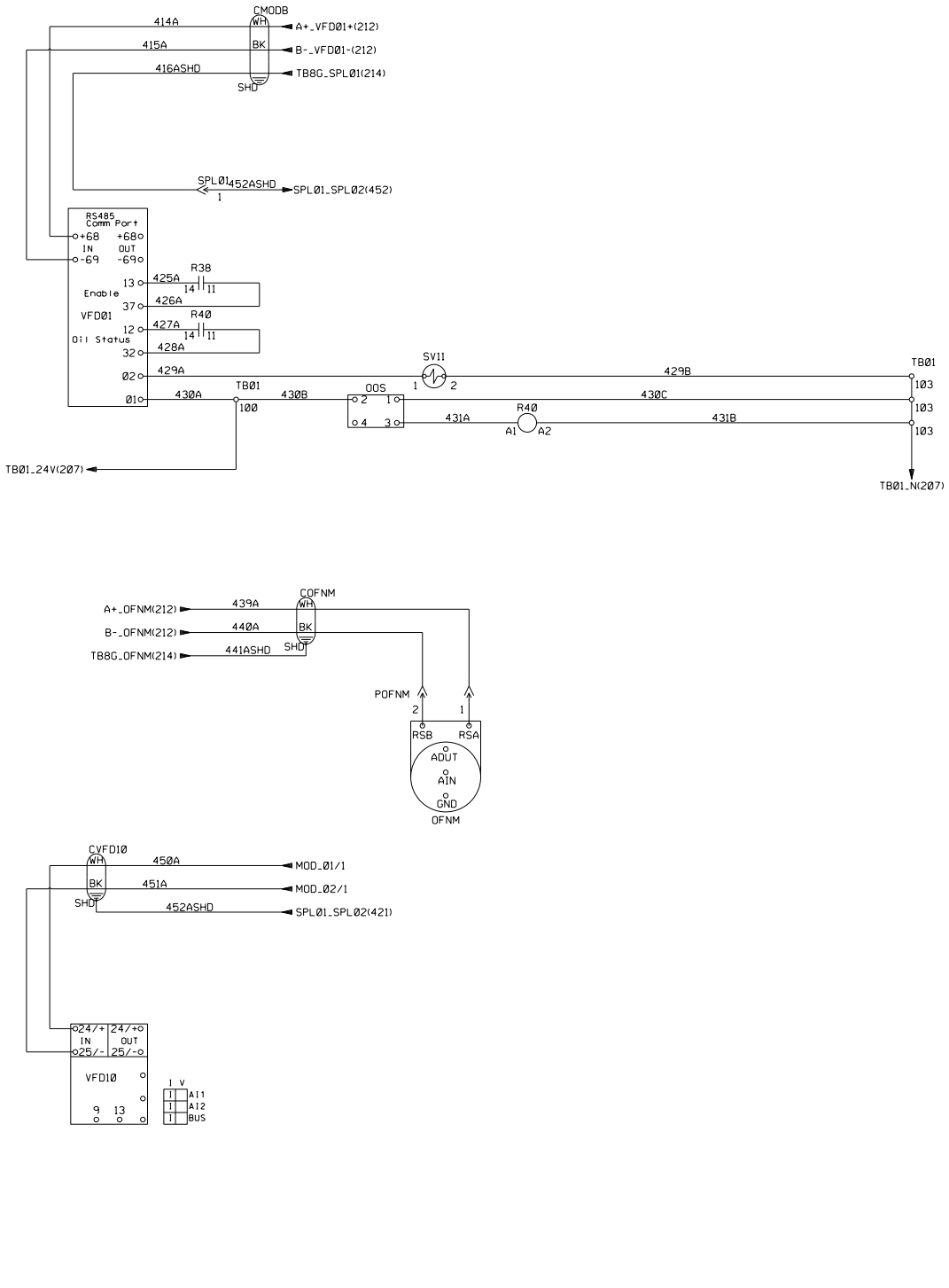
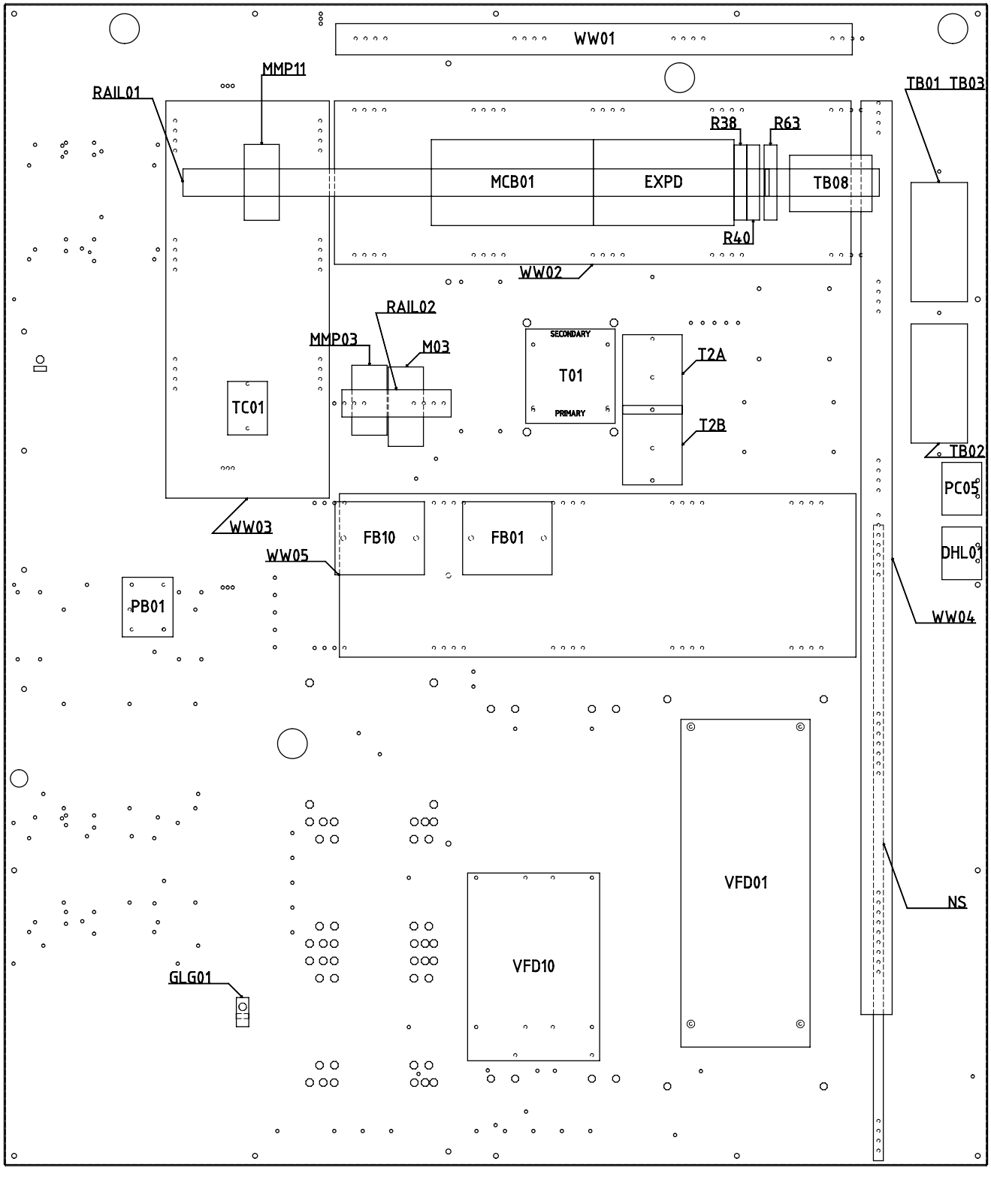


Figure 37 continued: ***Rebel (New Style) Electrical Diagram***



Typical Electrical Drawings - Self Contained

Figure 38: Self Contained Electrical Diagram

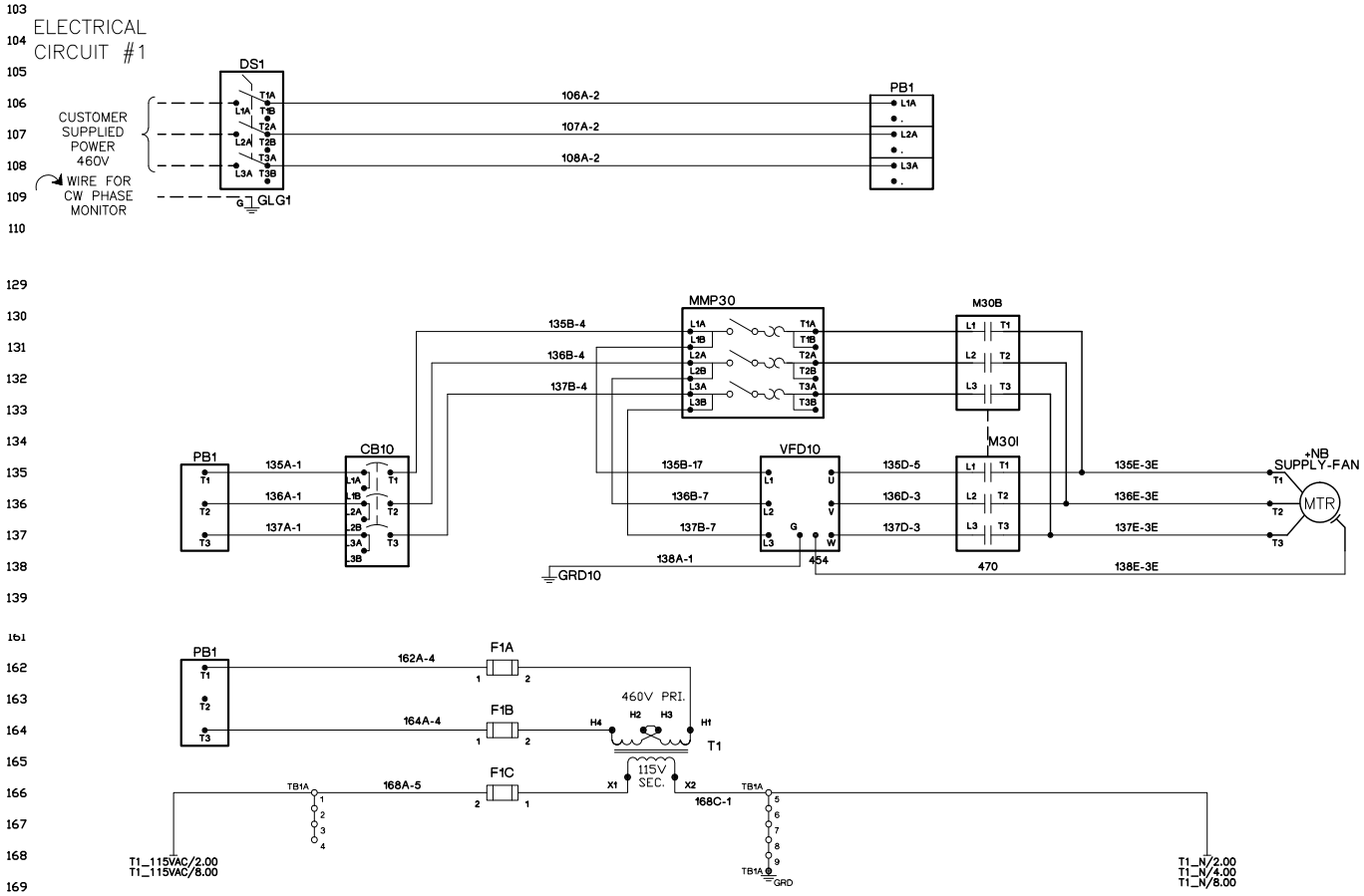


Figure 38 continued: Self Contained Electrical Diagram

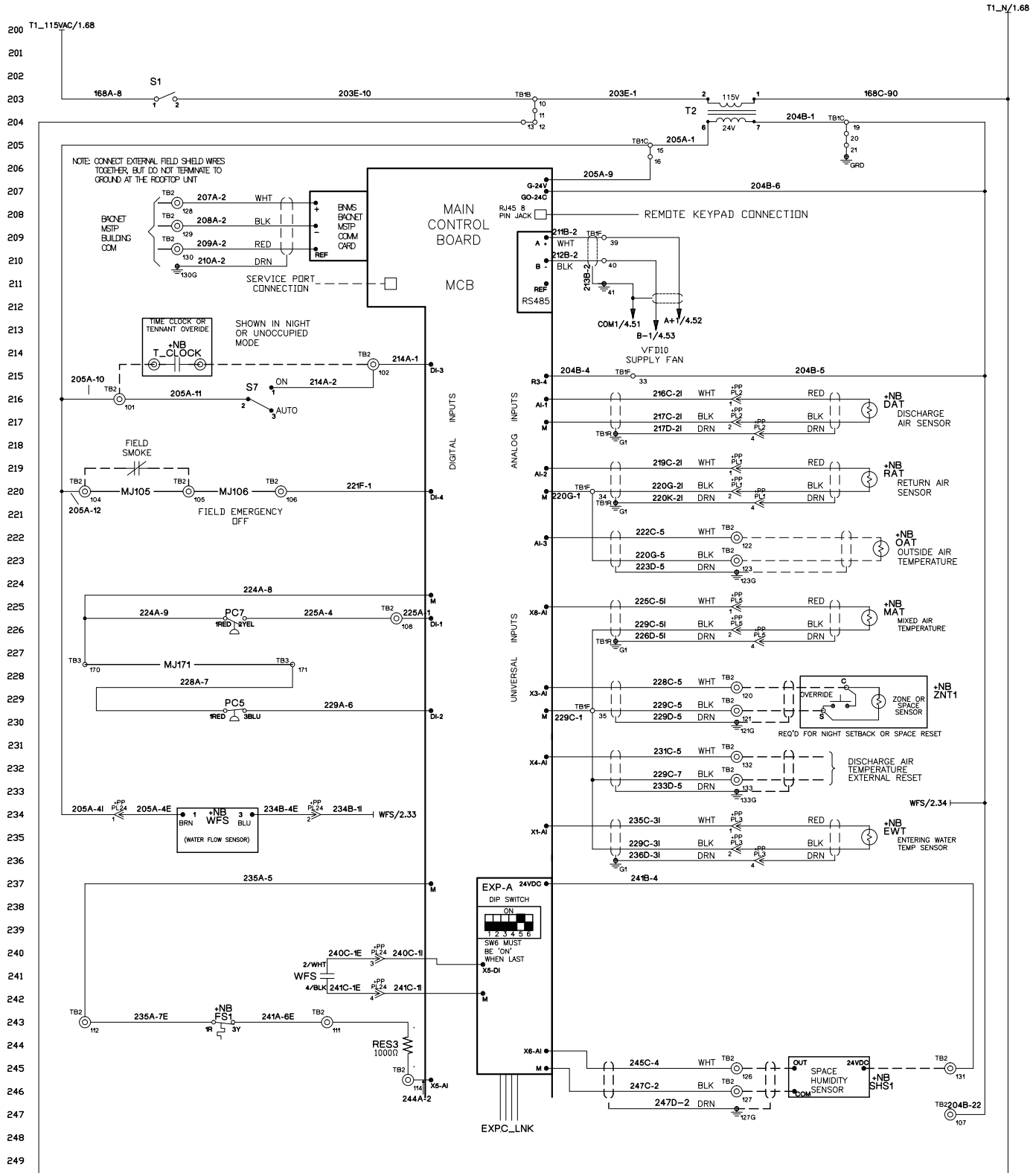


Figure 38 continued: Self Contained Electrical Diagram

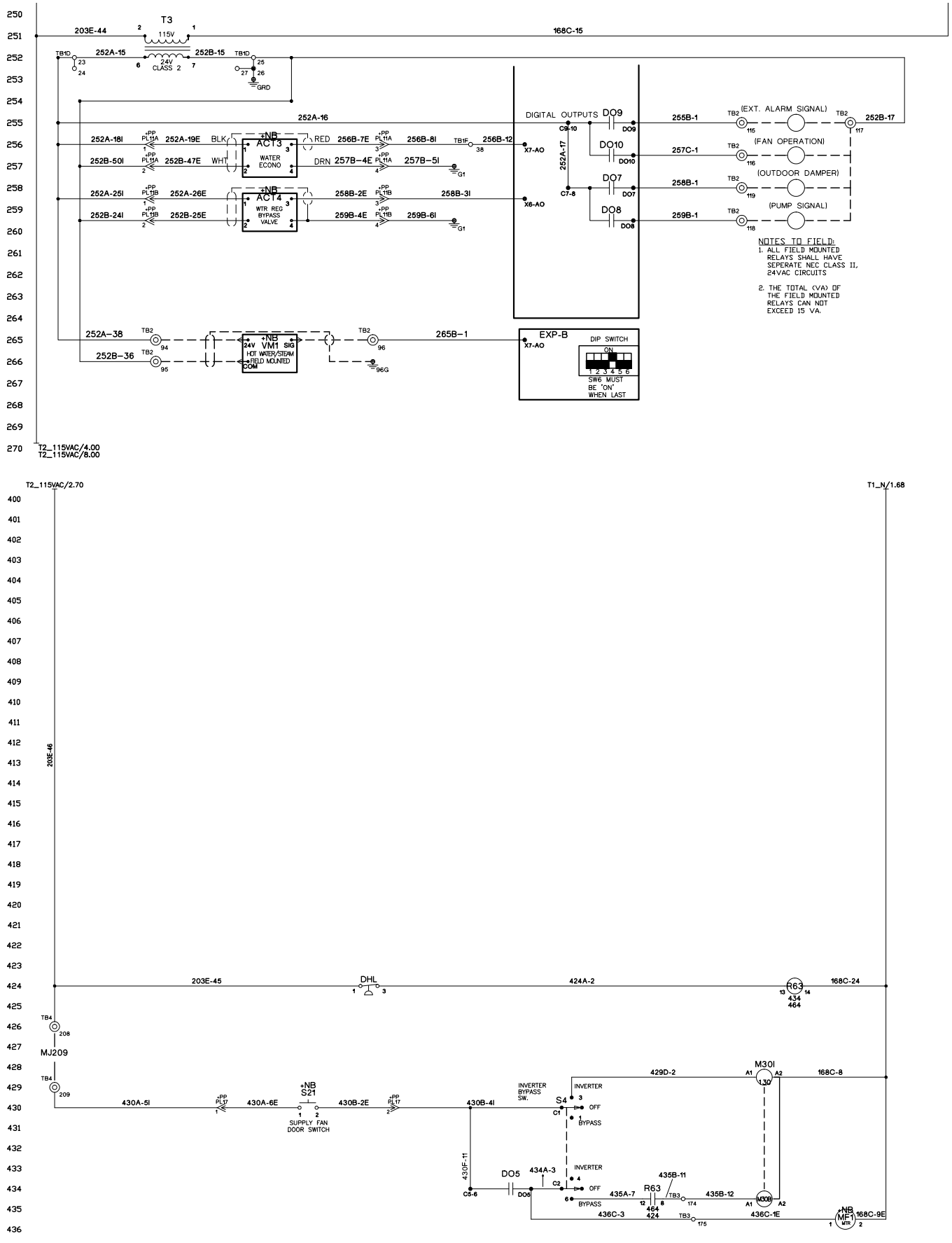


Figure 38 continued: Self Contained Electrical Diagram

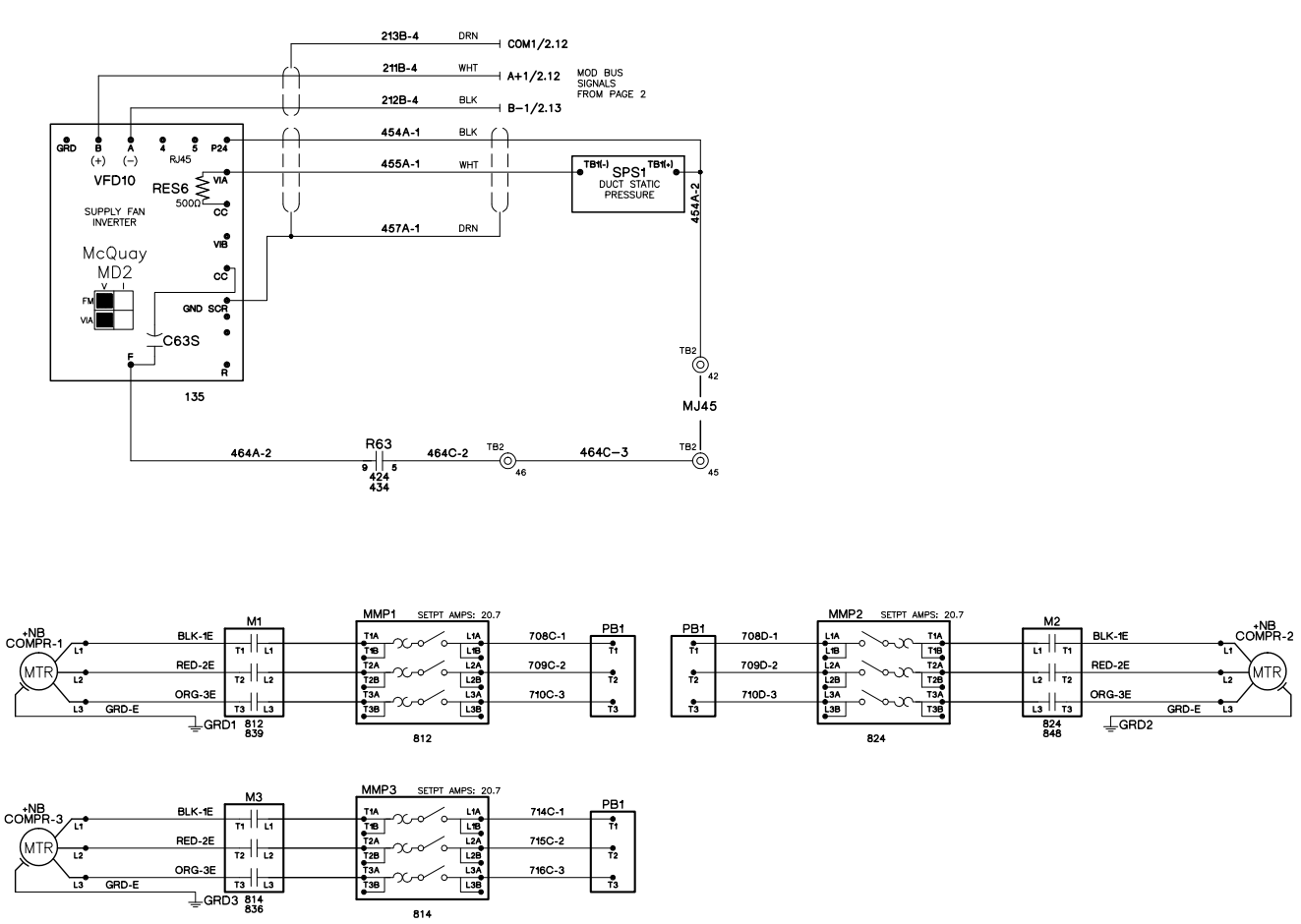


Figure 38 continued: Self Contained Electrical Diagram

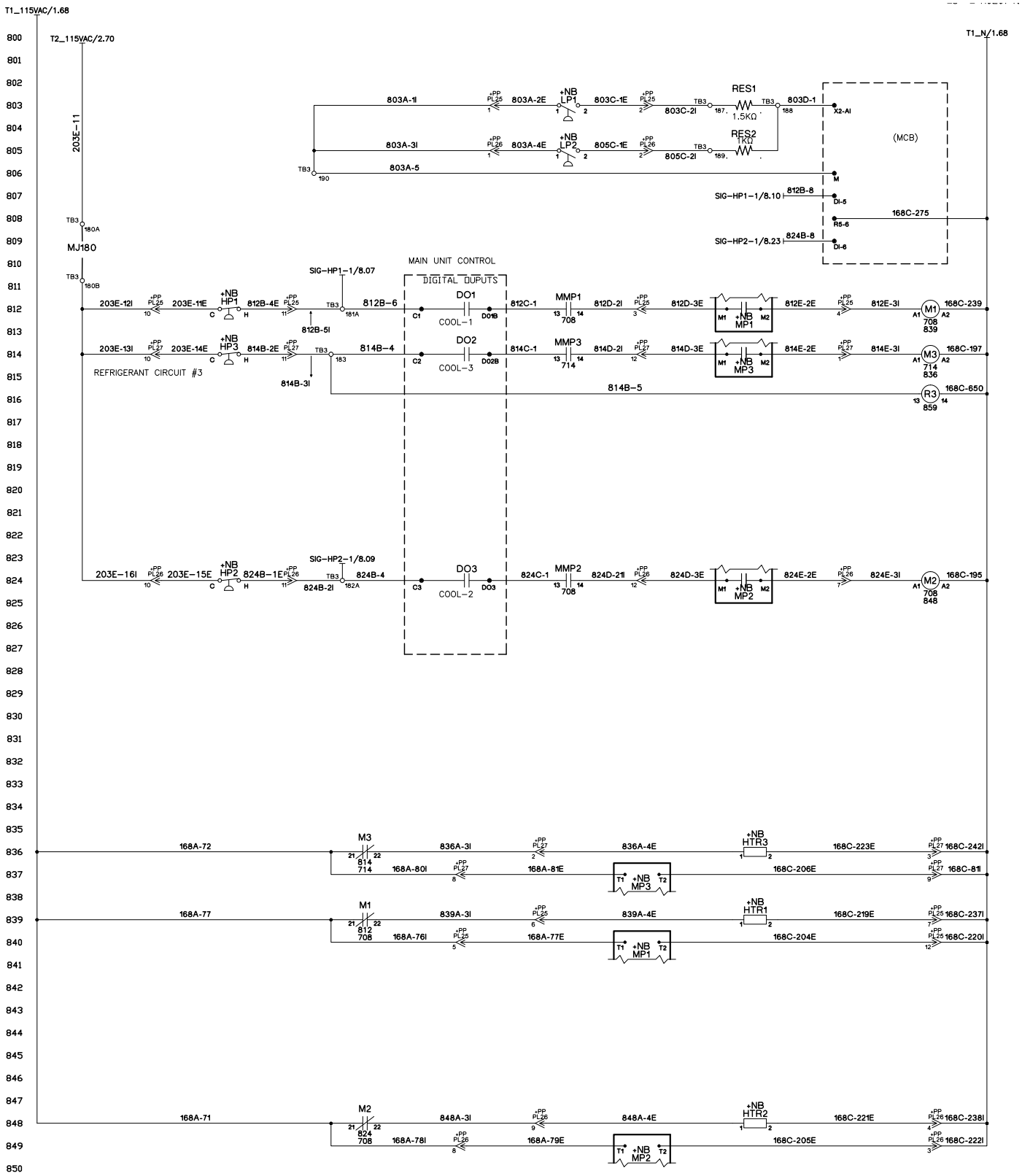
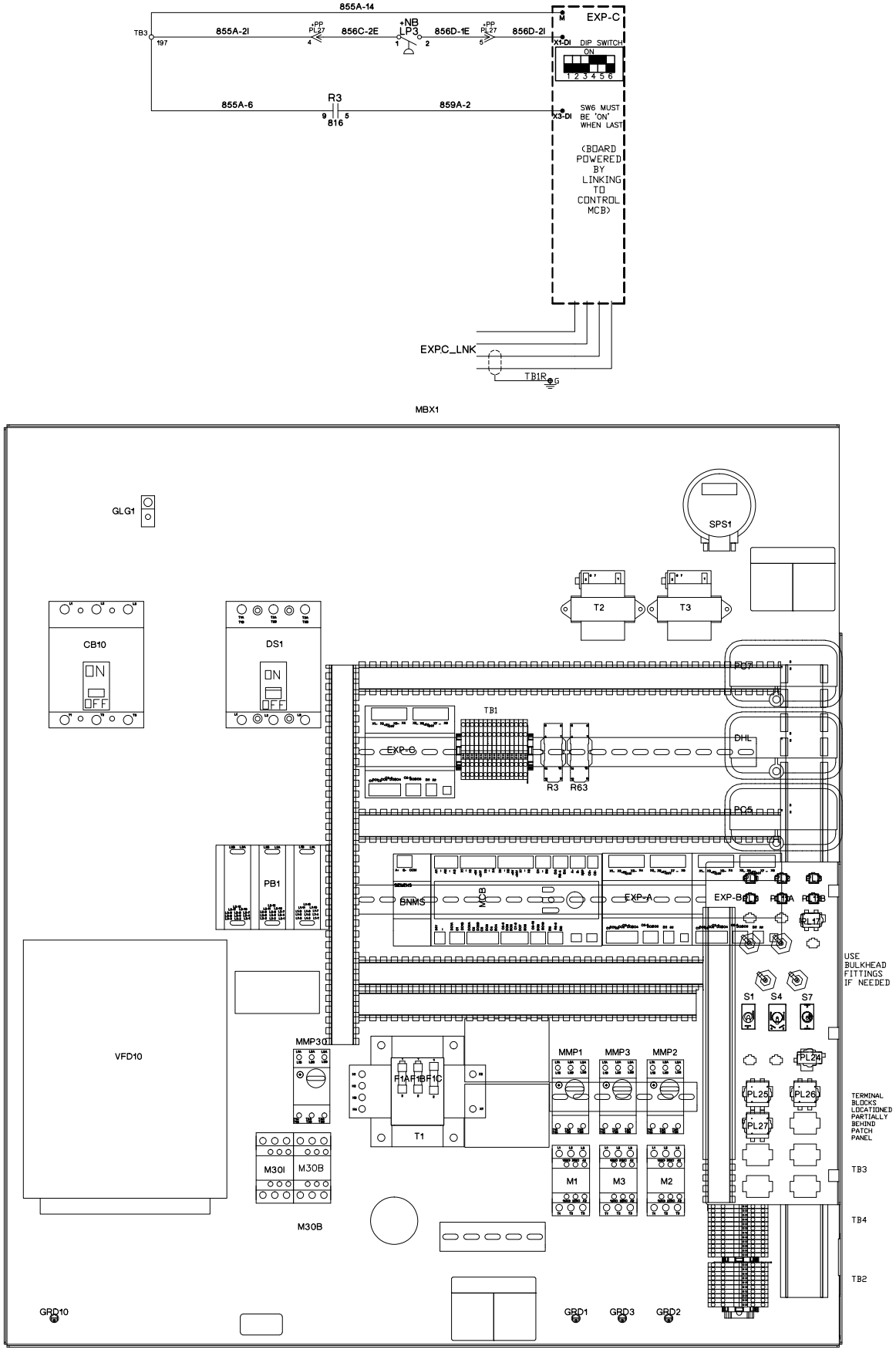


Figure 38 continued: Self Contained Electrical Diagram



Parts List

Table 24: Parts List

Component Designation	Description	Daikin Applied Part Number
MCB	Main Control Board - MicroTech Unit Controller	193407301
EXP A, B, C	Expansion Module	193407501
ZNT1	Zone Temperature Sensor with Tenant Overide	113117701
ZNT1	Zone Temperature Sensor with Tenant Overide & Remote set point adjustment	113117801
DAT	Discharge Air Temperature Sensor	193414602
EFT	Entering Fan Air Temperature Sensor	193414602
OAT	Outside Air Temperature Sensor	193414602
RAT	Return Air Temperature Sensor	193414602
MAT	Mixed Air Temperature Sensor	193414602
EWT	Entering Water Temperature Sensor	193414602
ER EAT	Energy Recovery Wheel Discharge Air Temperature Sensor	193414602
ER LAT	Energy Recovery Wheel Exhaust Air Temperature Sensor	193414602
SPS1, 2	Duct Static Pressure Sensor	910117462
SPS3	Building Static Pressure Sensor	910117463
PSR1,2	Refrigerant Pressure Transducer Circuit 1	331764601
SHS1	Space Humidity Sensor, wall mount	067294901
SHS1	Space Humidity Sensor, duct mount	067295001
WFS	Water Flow Switch	910103980
—	MCB to EXP Direct Connector	193409701
—	MCB to EXP Remote Connector	193409901
—	MCB to Communication Module Connector	300047027
—	Communication Module – LON-SCC	090016711
—	Communication Module – LON-DAC	090016712
—	Communication Module - BACnet MSTP	090016710
—	Communication Module - BACnet IP	090016709
—	Controller Terminal Block - 2 pole	193410302
—	Controller Terminal Block - 3 pole	193410303
	Controller Terminal Block - 5 pole	193410305
	Controller Terminal Block - 6 pole	193410306
	Controller Terminal Block - 7 pole	193410307
	Controller Terminal Block - 8 pole	193410308

Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin Applied equipment, its care should be a high priority. For training information on all Daikin Applied HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin Applied equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied Representative for warranty details. To find your local Daikin Applied Representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787). To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to www.DaikinApplied.com.

Products manufactured in an ISO Certified Facility.