SECTION 8 – SERVICE

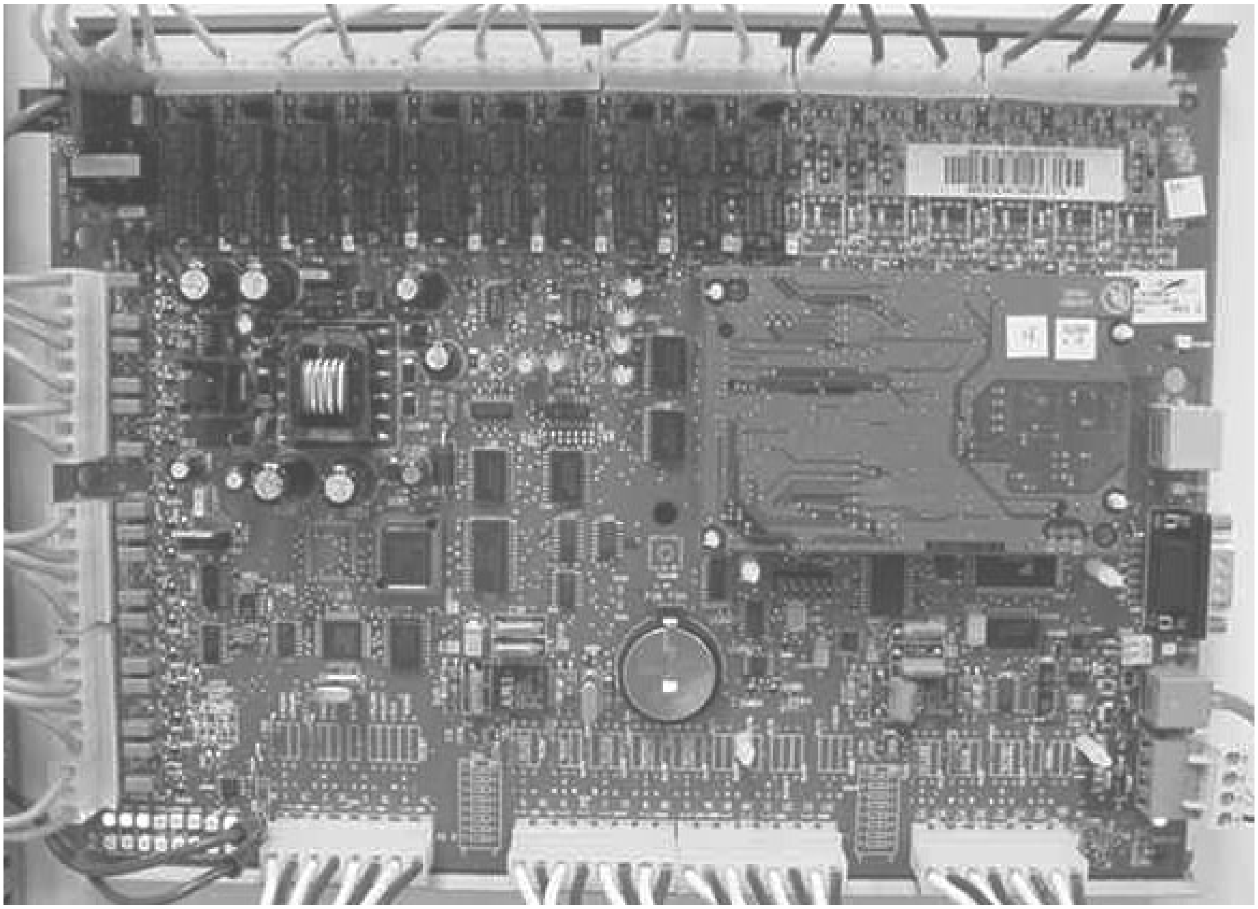

FIG. 48 – PRIMARY UNIT CONTROLLER

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The eco^2 rooftop Primary Unit Controller (Primary Unit Controller) is a factory-mounted controller that uses a microprocessor-based control. The controller is housed inside the low-voltage compartment of the control/power panel. The main controller is located in the control side (right side) of the panel and is shown in Figure 48.

The main controller will be referred to as the Primary Unit Controller and is factory mounted on every unit. The Primary Unit Controller interfaces to a possible 16 binary inputs, 13 analog inputs, 10 binary outputs, and 6 analog outputs, that are used to control the rooftop unit.

The connection "layout" for the IO (inputs/outputs) is shown in the Primary Unit Controller connection map in Figure 49. Notice that the figure shows the Jack connection designated by "J", and the pin number located on the inside of the board diagram. The input or output designations are shown on the outside of the figure.

Table 32 lists the description of the various inputs and outputs, and the respective connections.

Figure 50 shows the Primary Unit Controller architecture as it relates to the on-board relays for the binary outputs and the associated LED's, the location of the binary input LED's, and LED's for the Ethernet port, RS-232 port, the N2 port used for communication to the Secondary Controller only, and a Alarm LED for the Primary Unit Controller. A solid or flashing Alarm LED indicates a problem with the Primary Unit Controller – contact your local York service office for service.

The respective on-board binary output relay LED will be illuminated when the relay is being energized by the Primary Unit Controller. The various communication port LED's will "flicker" when communication is present. Figure 50 illustrates the binary input LED's and designations.

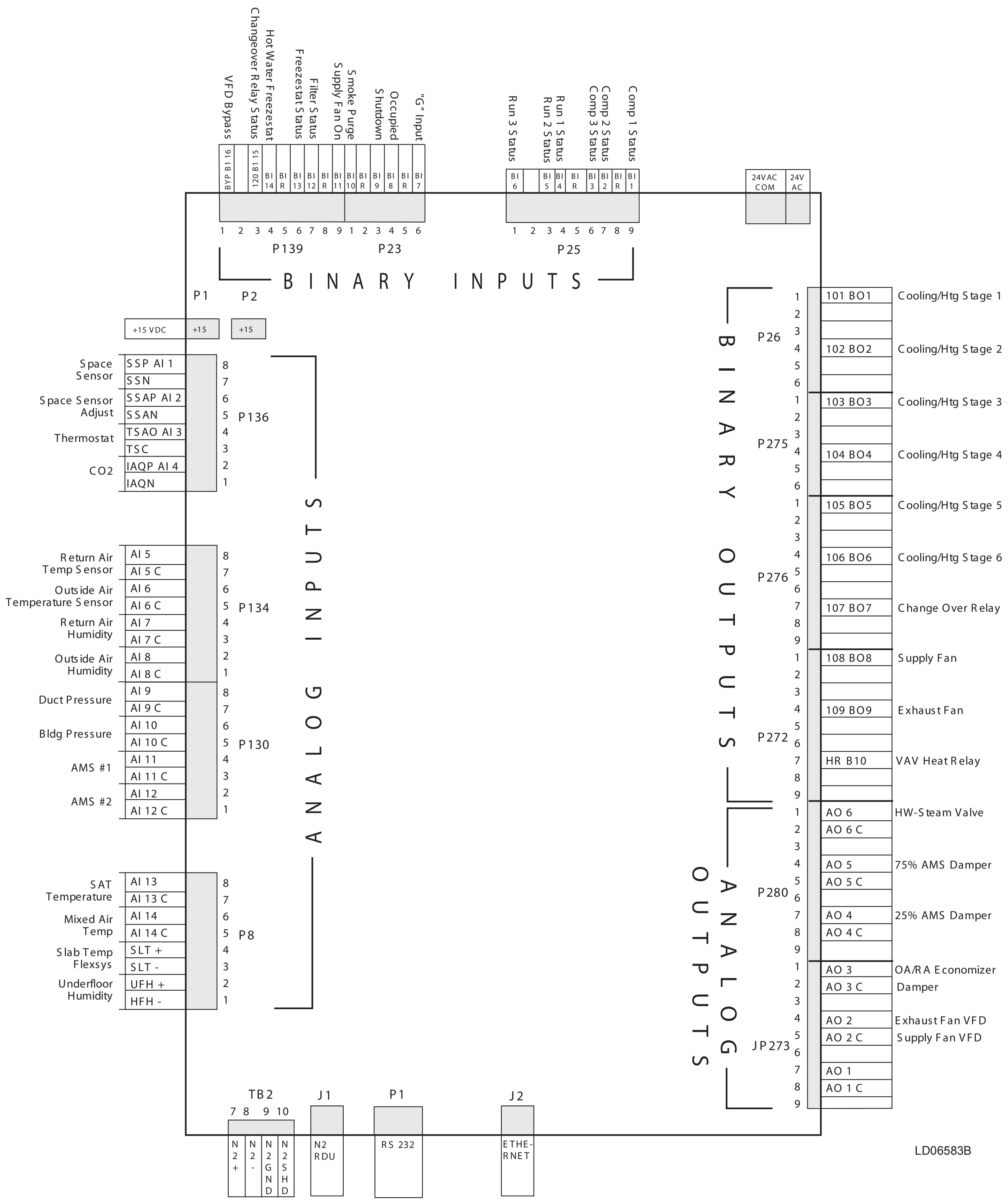

FIG. 49 – PRIMARY UNIT CONTROLLER CONNECTION MAP

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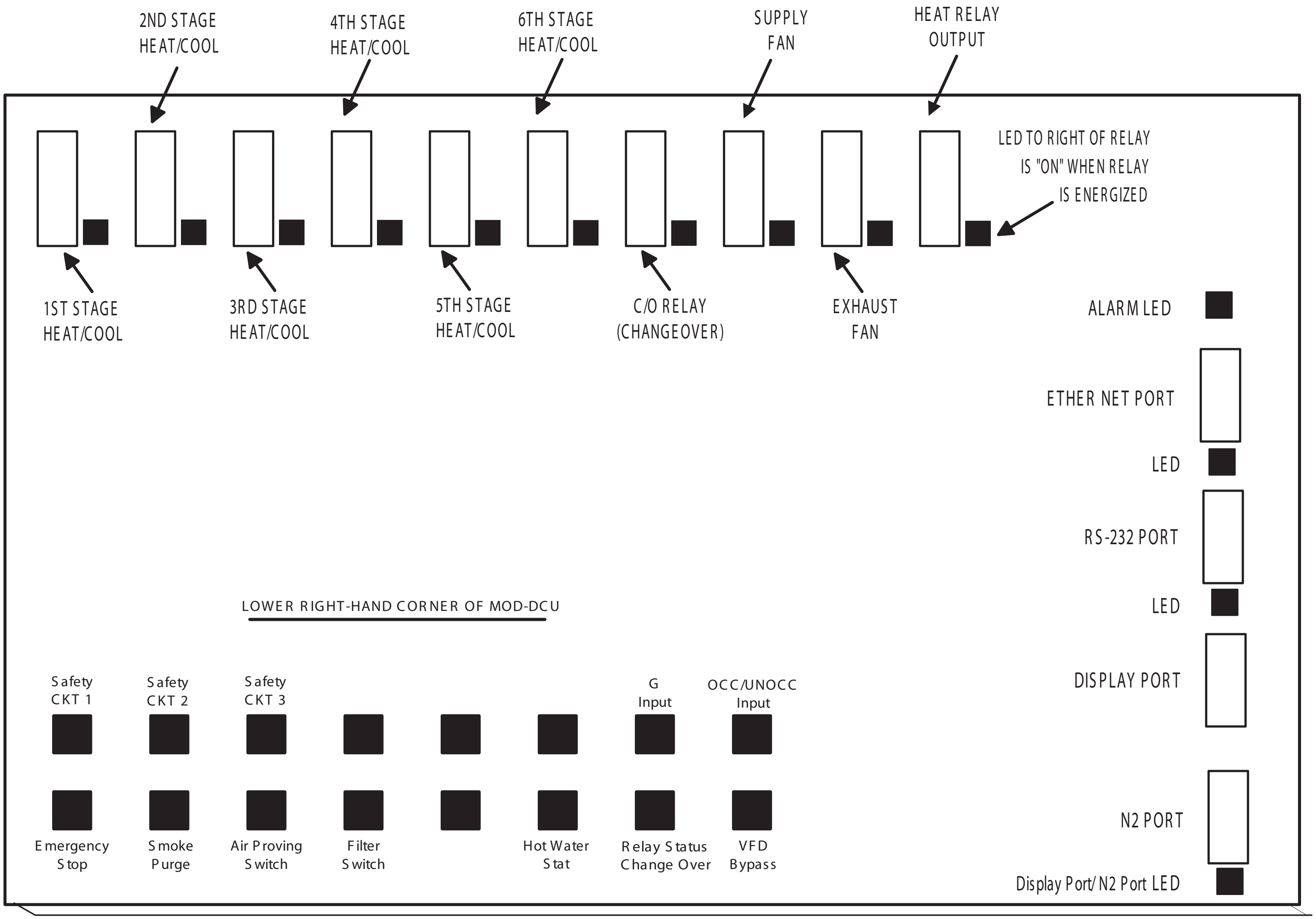

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FIG. 50 – BINARY LED DESIGNATIONS

BINARY INPUT OPERATION

This section describes the control operation of the sixteen (16) binary inputs. The Binary inputs are also described in the I/O tables in Table 33.

The unit control is equipped with sixteen (16) binary inputs. The binary inputs can be classified into two types, control and status inputs. Control inputs will be used by the control to switch control states. For example, BI #7 (J8, Pin 6), Supply Fan (G), will signal to the control to turn the supply fan ON or OFF. Status inputs will be used by the control to signal the status of, or prove, certain safety circuits. For example, BI #11 (J9, pin 9), Supply Fan Status, will signal to the control when the Supply Fan is ON and thus prove the operation of the Supply Fan.

The binary input status is defined as:

- 24VAC detected by the input - the input is “present”
- No voltage detected by the input or voltage below the 24VAC detection threshold - the input signal is “not present”

The fault conditions and responses for all binary inputs with associated faults are given in Table 33.

BI #1, 2, & 3 - Compressor Circuit #1, 2, & 3 Status Inputs

Each refrigeration circuit consists of two compressors arranged in tandem. For safety, each circuit is equipped with a “compressor safety chain”, which consists of high and low pressure safeties and overloads for each compressor motor. The electrical contacts for the safety devices in this chain will be connected in series with the entire circuit connected to a 24VAC source. In a “safe” state, the electrical contacts from all safety devices will be closed. The “compressor safety chain” for each compressor circuit will be connected to the following binary inputs:

- Compressor circuit #1 – BI #1
- Compressor circuit #2 – BI #2
- Compressor circuit #3 – BI #3

High Pressure Switch settings are:
open @ 425 +/- 10 psig
close @ 325 +/- 10 psig

Low Pressure Switch settings are:
open @ 32 +/- 5 psig
close @ 52 +/- 5 psig

For normal operation, the Compressor Circuit Status inputs must be present (24VAC to input). During low ambient conditions, when no compressor is ON, the Low Pressure safety may be tripped (open) indicating an unsafe condition. To avoid nuisance errors:

- The control will monitor the Compressor Circuit Status inputs only when a compressor from that circuit is operating.
- When any compressor is started, the control will ignore the associated Compressor Circuit Status input for 30 seconds.
- After the 30 second delay, if the status input is not present for more than 250 ms, the control will de-energize all compressors operating in that circuit and declare a Comp Safety Trip fault.
- The control will then wait ten (30) minutes before re-energizing the compressors in the tripped circuit, if still required.

Each Compressor Status Circuit input has two trip counters. Both counters will start at zero.

Counter #1 will:

- Increment by 1 any time a trip occurs.
- Be reset to zero counts if one or both compressors on the circuit are ON for 1 hour without a Comp Safety Trip.

Counter #2 will:

- Increment by 1 any time a trip occurs and both compressors are operating.
- Be reset to zero counts if both compressors on the circuit are ON for 1 hour without a Comp Safety Trip.

If the count of either Compressor Status counter on a compressor circuit = 3, the compressors on the circuit are shut down and locked out and a Compressor Safety Lockout (Comp Safety L/O) fault is declared.

Compressor Safety Lockout(s) will reset through power cycling of the controller.

BI #4, 5, & 6 , Furnace Module #1, 2, & 3 Status

For future use.

BI #7, Thermostat "G" Input

The thermostat "G" or fan output is connected to BI #7. BI #7 is monitored when the controller determines that a thermostat is to be used for temperature control. The Supply Fan is controlled as follows subject to specific conditions described in the Constant Volume or Variable Air Volume sections:

- Turn Supply Fan ON – 24VAC input present.
- Turn Supply Fan OFF - 24VAC input not present.

BI #8, Occupied / Unoccupied Input

The Occupied/Unoccupied input is used to determine when occupied or unoccupied control modes are to be used. The source of the input may be a time clock, a thermostat with a clock function or an occupancy sensor. The occupancy status is indicated as;

- Occupied – Occupied/Unoccupied 24VAC input present.
- Unoccupied – Occupied/Unoccupied input 24VAC not present.

BI #9, Shutdown Input

The Shutdown input will be monitored by the control. The control will interpret the Shutdown input as follows:

- Shut down condition – Shutdown 24VAC input present.
- Not in shut down condition – Shutdown 24VAC input not present.

When the Shutdown input is present, the control will within 1 second:

- Set all binary outputs to low (de-energize).
- Set all analog outputs to zero volts.

This input will have priority over all operation.

BI #10, Smoke Purge Input

The Smoke Purge input will monitored by the control. The control will interpret this input as follows:

- Smoke purge required – Smoke Purge 24VAC input present.
- Smoke purge not required – Smoke Purge 24VAC input not present.

When the Smoke Purge input has been continuously present for 5 seconds or more, the control will:

- Read the Smoke Purge parameter value.
- If the Smoke Purge parameter value is zero, no action is taken.
- If the Smoke Purge parameter value is not zero.
- All heating or cooling is shutdown and made unavailable.
- The configured Smoke Purge Operation will be carried out.

BI #11, Supply Fan Status

An airflow switch is used to verify the status of the Supply Fan. When airflow is detected, the binary 24VAC input is present.

Supply Fan Fault:
When the control turns the Supply Fan ON, the Supply Fan Status input will be monitored following a 60 second start up delay. If the Supply Fan Status input is not present after the delay, the unit is shut down and a "*Supply Fan Fault"* is declared.

If the Supply Fan is operating normally and the Supply Fan Status input is no longer present, the control will delay for 30 seconds. If after 30 seconds, the input is not present, the control will shut down the unit and declare a "*Supply Fan Fault"* fault.

If a "*Supply Fan Fault"* occurs, the controller will require a manual reset to clear the fault and allow the unit to restart.

Air Switch Fault:
When the Supply Fan is shut OFF, if the Supply Fan Status input is still present after a 5 minute shutdown delay, the control will declare an "*Air Switch Fault"* fault.

NOTE

An Air Switch Fault will not cause the unit to shut down; however, the fault will remain active until the air proving switch indicates normal operation.

BI #12, Filter Status

The Filter Status input will be tied to a differential pressure switch, which will be used to indicate if the filters are dirty. The filter status will be indicated as:

- Filter dirty – Filter Status 24VAC input present
- Filter clean – Filter Status 24VAC input not present

  The control will declare a dirty filter fault after the Filter Status input has been present for one minute.

  The Dirty Filter Fault will remain active as long as the Filter Status input is present.

BI #13, Evaporator Freezestat Input

This input is not used on units with the smart relay installed. The smart relay monitors the freezestat circuit external to the (Primary Unit Controller).

BI #14, HW Freezestat Input

If the HW (hot water) Freezestat parameter is "ON" (indicating that a HW Freezestat sensor is installed and is to be used), the control will monitor this input. The HW Freezestat input will be interpreted as follows:

- No freeze condition – HW Freezestat 24 VAC input present
- Freeze condition – HW Freezestat 24 VAC input not present

When the HW Freezestat input opens, the control will:

- Open the Hot Water valve to 100%
- Close the OA damper(s) and open the RA damper to 100%
- HW Freezestat must close for 5 minutes before the unit will resume normal operation
- If the HW Freezestat input is open for 10 minutes, the control will declare a *HW Freeze Fault*, shut down the unit, and maintain the heating value output at 100%.

A *HW Freeze Fault* will remain active as long as the (hot water) Freezestat input is open. The fault will clear when the Freezestat input closes for 5 minutes.

HW (hot water) Thermostatic Switch Settings are:
- open @ 35° +4°/-2°
- close @ 47° +4°/-2°

NOTE

Note: This is an adjustable switch set (35° to 45°) set at the factory to 35°F.

BI #15, Cool-Heat Changeover Relay Status

The Cool-Heat Changeover Relay (COR) Status input is used to verify that the relays that route the ON/OFF commands from the controller to the heating and cooling equipment are as commanded by the controller. To verify that the changeover relays are as required for heating or cooling, the control will:

- For cooling operation – verify that the Cool-Heat COR Status 24VAC input is present
- For heating operation – verify that the Cool-Heat COR Status 24VAC input is not present

The control will delay 5 seconds from the time the Changeover Relay control output is switched before looking at the COR input for the Cool-Heat COR Status.

If the Cool-Heat COR Status input is not correct, a COR Fault is declared. The unit is shutdown. The fault is cleared through manual reset.

BI #16, VFD Bypass Input

This input will be used to signal to the control that the VFD has been bypassed and the supply fan is now running full. The control will interpret this input as follows:

- VFD not bypassed (normal condition) – VFD Bypass 24VAC input not present
- VFD bypassed – VFD Bypass 24 VAC input present (24VAC)

When VFD Bypass is present, the control will:

- Shut own all heating and cooling stages
- Shut down the Supply Fan if operating

The controller will wait 30 seconds from the time of the above control actions and then restart the Supply Fan by setting the Supply Fan output to ON (high). Normal heating or cooling operation will begin.

VFD Bypass operation will continue until the VFD Bypass input goes low (0 volts). The unit will then return to normal operation.

ANALOG INPUT OPERATION

This section describes the control operation of the (13) thirteen analog inputs. These inputs will be used by the control to monitor and respond to unit temperatures, pressures, enthalpy, etc. The connection "layout" for the IO (inputs/outputs) is shown in the Primary Unit Controller connection map in Figure 21. Notice that the figure shows the Jack connection designated by "J", and the pin number located on the inside of the board diagram. The input or output designations are shown on the outside of the figure. For example, J11 – 8 is jack eleven - pin 8 and is AI5 (analog input 5). J13 – 6 is jack 13 - pin 6 and is AI14 (analog input 14). For example, AI5 (J11 – 8) is the input for Outside Air Relative Humidity, and is used as part of the economizer control scheme. AI13 (J13 – 8) is the input for Supply Air Temperature, and is used for control in both the CV and VAV control schemes. The analog inputs are also in the I/O tables in Table 33 with descriptions for each input.

Return, Outside, Supply Air and Slab Temperature

The temperature sensors are RTD sensors that can be checked with an ohmmeter. Table 22 provides the resistance values for a given temperature in °F.

TABLE 22 – TEMPERATURE SENSOR RESISTANCE TABLE

TEMPERATURE SENSOR OUTPUT TABLE			
TEMP. °F	OHMS RESISTANCE	TEMP. °F	OHMS RESISTANCE
-20	751	80	1030
-10	777	90	1060
0	803	100	1090
10	830	110	1121
20	858	120	1152
30	885	130	1184
40	914	140	1216
50	942	150	1248
60	971	160	1281
70	1000	170	1314

Duct Pressure Transducer

The duct pressure transducer is mounted in the return air section of the unit on the panel wall. The purpose of this transducer is to sense and convert the static pressure in the supply-side of the duct to a DC voltage. The DC voltage is then sent to the unit controller and compare against the *Duct Static Pressure setpoint*. The control wiring is factory wired, but pneumatic tubing must be field supplied and installed (refer to Installation section in manual). The duct pressure transducer measures differential pressure between the pressure in the duct and atmospheric pressure. When verifying transducer operation, the technician must insert a tee into the pneumatic tubing to connect a manometer and verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the duct pressure vs. output volts DC from the transducer. Table 23 shows the relationship between the pressure applied to the duct pressure transducer and the output voltage.

TABLE 23 – *DUCT PRESSURE TRANSDUCER OUTPUT TABLE

DUCT PRESSURE TRANSDUCER OUTPUT TABLE		
DIFFERENTIAL INPUT PRESSURE - IWG		OUTPUT VOLTAGE - VDC
0.5	0.25	0.5
1.0	0.50	1.0
1.5	0.75	1.5
2.0	1.00	2.0
2.5	1.25	2.5
3.0	1.50	3.0
3.5	1.75	3.5
4.0	2.00	4.0
4.5	2.25	4.5
5.0	2.50	5.0

* 2.5 IWC Duct Transducer Available for FlexSys Option

Building Pressure Transducer

The building pressure transducer is located in the return air section of the unit. The purpose of this transducer is to sense and convert the static pressure in the building to a DC voltage. The DC voltage is then sent to the unit controller and compare against the *Building Pressure setpoint*. The control wiring from the transducer is factory wired, but pneumatic tubing must be field supplied and installed (refer to Installation section in manual). The building pressure transducer measures differential pressure between the pressure in the building and atmospheric pressure. When verifying transducer operation, the technician can insert a tee into the pneumatic tubing to connect a manometer and verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the duct pressure vs. output volts DC from the transducer. A practical and quick check of this transducer can also be accomplished by removing the pneumatic tubing lines from both high and low side connections on the transducer. Since both of the inputs will now be exposed to the same pressure, the differential pressure will be zero, and output 2.5 VDC according to the Table 24.

TABLE 24 – BUILDING PRESSURE TRANSDUCER OUTPUT TABLE

BUILDING PRESSURE TRANSDUCER OUTPUT	
DIFFERENTIAL INPUT PRESSURE - IWG	OUTPUT VOLTAGE - VDC
-0.50	0.00
-0.40	0.50
-0.30	1.00
-0.20	1.50
-0.10	2.00
0.00	2.50
0.10	3.00
0.20	3.50
0.30	4.00
0.40	4.50
0.50	5.00

TABLE 25 – AIR MEASURING STATION PRESSURE TRANSDUCER OUTPUT

AMS PRESSURE TRANSDUCER OUTPUT TABLE	
DIFFERENTIAL INPUT PRESSURE - IWG	OUTPUT VOLTAGE - VDC
0.000	0.00
0.025	0.50
0.050	1.00
0.075	1.50
0.100	2.00
0.125	2.50
0.150	3.00
0.175	3.50
0.200	4.00
0.225	4.50
0.250	5.00

Air Measuring Station Pressure Transducer

The rooftop unit provides for a ventilation mode that can use the optional Air Measuring Station. When using the optional Air Measuring Station, either one or two identical pressure transducers are employed. When using the Minimum AMS or the ¼ - ¾ AMS, two transducers are used. Only one transducer is used with the Full AMS. In any case, the locations of the transducers are in the return air section mounted on a panel. Both the pneumatic tubing and control wiring are factory installed. The transducer range is 0 to .25 iwg with an output range in volts DC as shown in Table 25.

Discharge Pressure Transducer

The optional discharge pressure transducer is located in common discharge line of the tandem compressors for each refrigerant circuit. The purpose of this transducer is to sense and convert the discharge pressure to a DC voltage. The DC voltage is then sent to the unit controller where it can control head pressure (with optional low ambient kit), provide compressor unloading, and display discharge pressure on the OptiLogic™ display panel. The transducer and wiring are factory installed. Whenever an optional transducer package is supplied, the transducer is wired to a factory supplied

TABLE 26 – DISCHARGE PRESSURE TRANSDUCER OUTPUT

DISCHARGE PRESSURE TRANSDUCER OUTPUT TABLE			
INPUT PRESSURE - PSIG	OUTPUT VOLTAGE - VDC	INPUT PRESSURE - PSIG	OUTPUT VOLTAGE - VDC
0	1.00	260	3.08
20	1.16	280	3.24
40	1.32	300	3.40
60	1.48	320	3.56
80	1.64	340	3.72
100	1.80	360	3.88
120	1.96	380	4.04
140	2.12	400	4.20
160	2.28	420	4.36
180	2.44	440	4.52
200	2.60	460	4.68
220	2.76	480	4.84
240	2.92	500	5.00

controller called the MOD-UNT. The MOD-UNT then communicates the pressures to the main unit controller (Primary Unit Controller) via an N2 communication buss. Figure 51 shows the MOD UNT controller, and Figure 52 illustrates the connections between the discharge pressure transducer, the MOD-UNT, and the Primary Unit Controller.

The Discharge Transducer has a range of 0 PSIG to 500 PSIG, with a linear output of 0 volts DC to 5 volts dc. Table 26 illustrates the DC volt output from the transducer for a given discharge pressure.

Suction Pressure Transducer

The optional suction pressure transducer is located in common suction line of the tandem compressors for each refrigerant circuit. The purpose of this transducer is to sense and convert the suction pressure to a DC voltage. The DC voltage is then sent to the unit controller where it can control head pressure (with optional low ambient kit), provide compressor unloading, and display suction pressure on the OptiLogic™ display panel. The transducer and wiring are factory installed. Whenever the optional transducer package is supplied, the transducer is wired to a factory supplied controller called the MOD-UNT. The MOD-UNT then communicates the pressures to the main unit controller (Primary Unit Controller) via an N2 communication buss. Figure 52 illustrates the connections between the suction pressure transducer, the MOD-UNT, and the Primary Unit Controller.

The Suction Transducer has a range of 0 PSIG to 200 PSIG, with a linear output of 0 volts DC to 5 volts DC. Table 27 illustrates the DC volt output from the transducer for a given suction pressure.

TABLE 27 – SUCTION PRESSURE TRANSDUCER OUTPUT

SUCTION PRESSURE TRANSDUCER OUTPUT TABLE			
INPUT PRESSURE - PSIG	OUTPUT VOLTAGE - VDC	INPUT PRESSURE - PSIG	OUTPUT VOLTAGE - VDC
0	1.00	110	3.20
10	1.20	120	3.40
20	1.40	130	3.60
30	1.60	140	3.80
40	1.80	150	4.00
50	2.00	160	4.20
60	2.20	170	4.40
70	2.40	180	4.60
80	2.60	190	4.80
90	2.80	200	5.00
100	3.00		

LOW AMBIENT OPTION – CONDENSER FAN MOTOR VSD

The low ambient option for the unit includes a variable speed drive (VSD) for the condenser fan motor. The VSD is located in an enclosure directly beneath the condenser fan coil. There will be one enclosure for each VSD. The VSD is a non-programmable specific application VSD circuit board that drives the condenser fan motor based on a signal from the MOD-UNT (see section on Sequence of Operation).

The condenser fan motor is driven by the VSD based on a variable 0 - 5VDC signal from the MOD – UNT. This signal is based on the pressure transducer output as compared to the preprogrammed "Discharge Pressure Control" setpoint (160 psig). The VSD outputs a 10 Hz to 60 Hz to the condenser fan motor to maintain the " Discharge Pressure Control" setpoint.

Fig. 53 illustrates the connections on the VSD board (also refer to the unit wiring diagrams at the end of this manual).

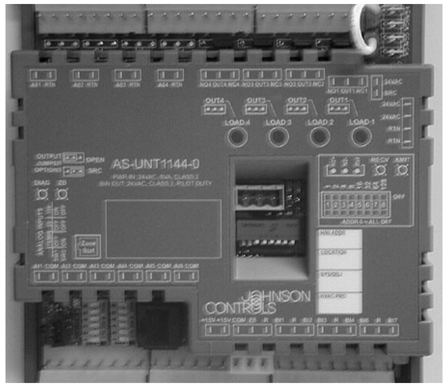

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FIG. 51 – SECONDARY CONTROLLER

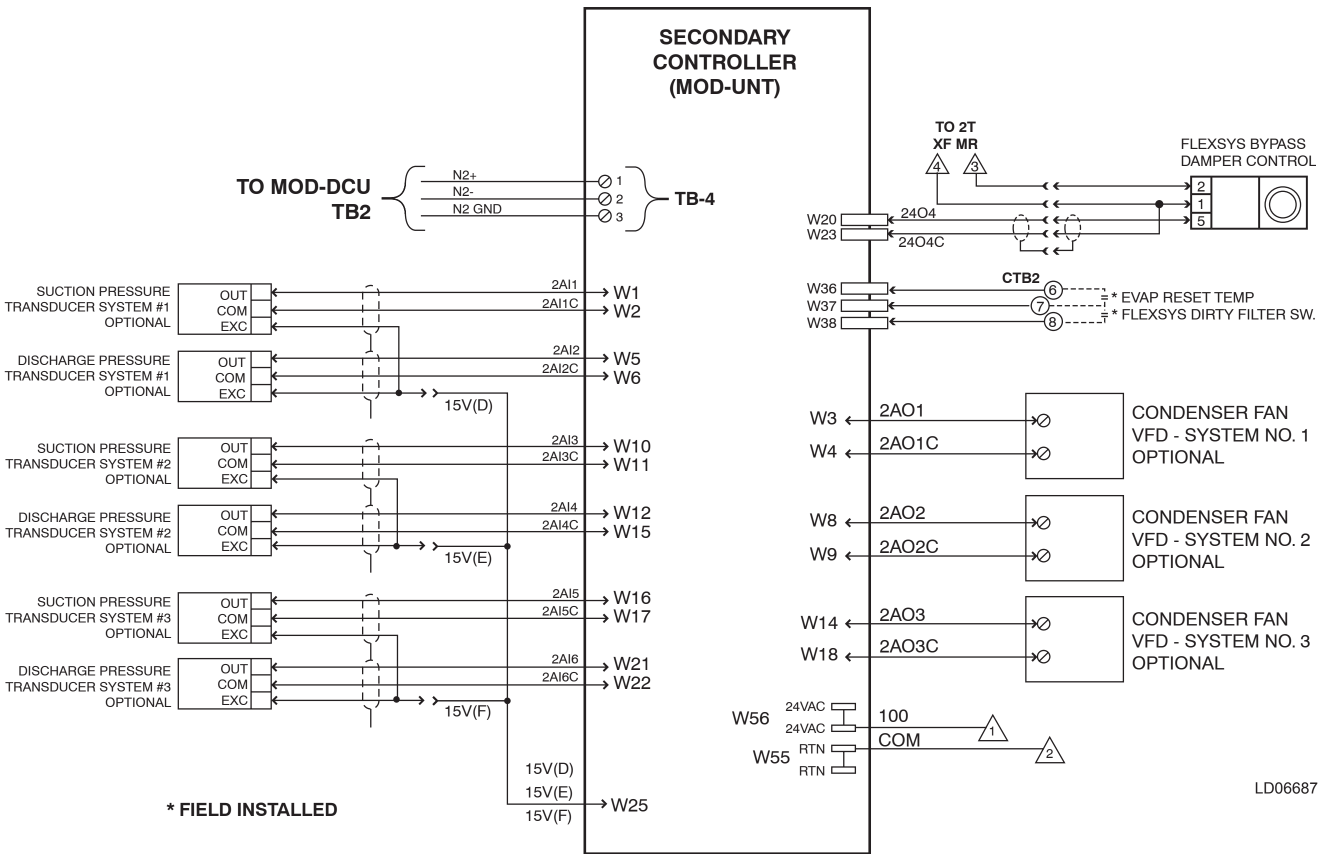

FIG. 52 – MOD-UNT WIRING DIAGRAM

TABLE 28 – MONITOR AND CONTROL I/O FOR MOD UNT CONTROLLER

I/O NAME	ANALOG OR BINARY	SIGNAL LEVELS	APPL. VALUE RANGE	WHERE USED
System 1, Suction Pressure	AI	1.0-5.0V	0 to 200	X'Ducer Package
System 1, Discharge (Condenser) Pressure	AI	1.0-5.0V	0 to 500	X'Ducer Package
System 2, Suction Pressure	AI	1.0-5.0V	0 to 200	X'Ducer Package
System 2, Discharge (Condenser) Pressure	AI	1.0-5.0V	0 to 500	X'Ducer Package
System 3, Suction Pressure	AI	1.0-5.0V	0 to 200	X'Ducer Package
System 3, Discharge (Condenser) Pressure	AI	1.0-5.0V	0 to 500	X'Ducer Package
Cond. Fan, System 1	AO	0-10V	0 to 100%	Low Ambient
Cond. Fan, System 2	AO	0-10V	0 to 100%	Low Ambient
Cond. Fan, System 3	AO	0-10V	0 to 100%	Low Ambient

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Humidity Temperature Sensor – Outside, Return and Underfloor (MIT)

The humidity/temperature sensor is a combination sensor that will output a 0 to 5 volt DC voltage in response to the relative humidity sensed. The humidity sensor is used in conjunction with the economizer function. The combination sensor also has a temperature sensor that senses the outdoor air temperature and has the same resistance value of a "stand-alone" outdoor sensor. The resistance value for a specific outdoor temperature is shown in Table 22. Note that the combination humidity/temperature sensor has four terminals – two for the humidity sensor and two for the temperature sensor.

TABLE 29 – HUMIDITY SENSOR OUTPUT

HUMIDITY SENSOR OUTPUT TABLE			
% RELATIVE HUMIDITY	OUTPUT VOLTAGE - VDC	% RELATIVE HUMIDITY	OUTPUT VOLTAGE - VDC
5	0.25	55	2.75
10	0.50	60	3.00
15	0.75	65	3.25
20	1.00	70	3.50
25	1.25	75	3.75
30	1.50	80	4.00
35	1.75	85	4.25
40	2.00	90	4.50
45	2.25	95	4.75
50	2.50	100	5.00

CO_2 Sensor

The CO_2 sensor is used in conjunction with the *Demand Ventilation* option. The demand for ventilation is determined by comparing the level of CO_2 in the building to the *Demand Ventilation Setpoint***.** The CO_2 level in the building is measured by the CO_2 sensor and outputs 0 to 5 volts DC based on the level of carbon dioxide sensed. The unit controller then modulates the outside air dampers to bring the level of CO_2. Table 30 illustrates the DC output for a given CO_2 level.

TABLE 30 – CO_2 SENSOR OUTPUT

CO_2 OUTPUT TABLE			
PPM CO_2	OUTPUT VOLTAGE - VDC	PPM CO_2	OUTPUT VOLTAGE - VDC
200	0.40	2800	5.60
400	0.80	3000	6.00
600	1.20	3200	6.40
800	1.60	3400	6.80
1000	2.00	3600	7.20
1200	2.40	3800	7.60
1400	2.80	4000	8.00
1600	3.20	4200	8.40
1800	3.60	4400	8.80
2000	4.00	4600	9.20
2200	4.40	4800	9.60
2400	4.80	5000	10.00
2600	5.20		

Primary Unit Controller Analog Outputs

The Primary Unit Controller has six analog outputs that send a 0 to 10 volt DC signal to the respective actuator. Table 33 shows the analog outputs designated as AO1 through AO6, and the respective function. Note the outputs are speed reference signals to he supply fan VFD, exhaust fan VFD or exhaust damper, damper actuators for outside air/return air dampers, air measuring dampers, and heating valve. The 0 to 10 volt DC output would be linear over the respective actuator range of travel, or over the VFD frequency range of 0 to 60 Hz. As an example, if the output to the outside air damper actuator were 5 volts DC, the outside air damper actuator would be driven to one-half of its range of travel. Another example would be a 4 volt DC voltage sent to the supply fan VFD as the speed reference signal. This would “drive” the VFD to 24 hertz [(voltage reference signal X 60) / 10 volts]. The actuator connections are:

Terminal 1 = 24VAC Common

Terminal 2 = 24VAC, and

Terminal 5 = 0 - 10VDC signal.

Primary Unit Controller Binary Outputs

The Primary Unit Controller has 10 binary outputs that switch 24 volt AC to relays to cycle compressors, supply fan, exhaust fan, etc (refer to unit wiring diagram). The outputs are “dry contact” relays on-board the unit controller (Primary Unit Controller) that will output 24 volts when energized by the unit controller. The 24 volt AC output will then energize the respective relays. Table 33 lists the output designations.

Optional Thermostat Interface Board (See Fig. 53)

There are no field connections required to the thermostat interface board. Any thermostat that is field wired will be connected at CTB1 in the control panel of the rooftop unit and not to the thermostat interface board.

The thermostat interface provides the interface from an ordinary two-stage heat, two-stage cool thermostat to the Primary Unit Controller. The function of the thermostat interface board is to covert the thermostat inputs, which are basically binary inputs, to one analog output that connects to the Primary Unit Controller at analog input TSAO (J10-4). The DC voltage output for respective thermostat inputs is shown in Table 31.

TABLE 31 – THERMOSTAT INTERFACE BOARD VOLTAGE OUTPUTS

ANALOG OUTPUT	W2	W1	Y1	Y2
0.0	Fault	Fault	Fault	Fault
0.5	OFF	OFF	ON	ON
1.0	OFF	OFF	ON	OFF
1.5	OFF	OFF	OFF	ON
2.0	OFF	OFF	OFF	OFF
3.0	ON	OFF	OFF	OFF
4.0	OFF	ON	OFF	OFF
5.0	ON	ON	OFF	OFF

Binary “pass-through” Connections.

Four of the T'stat interface board inputs, G, OCC, SD, Smoke Purge are connected directly from the field installed T’stat to the Primary Unit Controller binary inputs (refer to Binary Inputs). These inputs are still routed through the T'stat Interface board along with the other T'stat inputs, but they only use the T’stat Interface Board as a connecting point. Table 32 lists the connections and functions.

TABLE 32 – THERMOSTAT INTERFACE BOARD CONNECTIONS

T'STAT TERMINALS	FUNCTION	MOD DCU CONNECTION	FUNCTION
R	24 VAC from controller	R	24 VAC from controller
Y1	COOL 1	TSAO	Analog voltage
Y2	COOL 2	TSAO	Analog voltage
W1	HEAT 1	TSAO	Analog voltage
W2	HEAT 2	TSAO	Analog voltage
G			Not Used
OCC			Not Used
SD			Not Used
P			Not Used
X			Not Used
C	Common	C	Common from controller

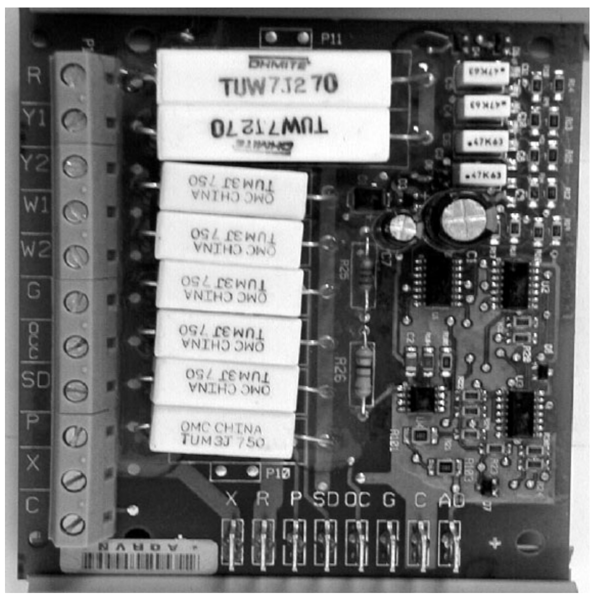

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FIG. 53 – THERMOSTAT INTERFACE BOARD (OPTIONAL)

Table 33 lists the description of the various inputs and outputs, and the respective connections to the Primary Unit Controller.

TABLE 33 – INPUT/OUTPUT TABLE

I/O NAME	INPUT/OUTPUT TYPE	SIGNAL LEVEL	APP VALUE RANGE	APPLICATION
Space Sensor	AI 1 (SSP)	1K RTD		ALL
Space Sensor Adjust	AI 2 (SSAP)	1.5K POT	0 to 1500	ALL
T'Stat Interface	AI 3 (TSAO)	0-5V	0 to 100	ALL
CO2	AI 4 (IAQ)	0-5V	0 to set by RDU	DEMAND VENTILATION
Return Temperature	AI 8	1K RTD	-50 to 250	DIFF. ENTH. ECONO
Outside Air Temperature	AI 6	1K RTD	-50 to 250	ALL
Return Air Humidity	AI 7	0-10V	0 to 100	DIFF. ENTH. ECONO
Outside Air Humidity	AI 5	0-10V	0 to 100	SINGLE ENTH. ECONO
Duct Static Pressure	AI 9	0-5V	0 to 5	VAV
Building Static Pressure	AI 10	0-5V	-.25 to .25	POWER EXHAUST
OA Flow Meas. #1 - All AMS	AI 11	0-5V	0 to .5	OA FLOW STATION
OA Flow Meas. #2 - 25/75 AMS	AI 12	0-5V	0 to .5	OA FLOW STATION
Supply Temperature	AI 13	IK RTD	-50 to 250	ALL
Mixed Air Temperature	AI14	IK RTD	-50 to 250	FLEXYS
Slab Temperature	AI15	IK RTD	-50 to 250	FLEXYS
Underfloor Humidity	AI16	0-10V	0 TO 100	FLEXYS
Compressor Circuit #1 Status	BI 1	24VAC		ALL
Compressor Circuit #2 Status	BI 2	24VAC		ALL
Compressor Circuit #3 Status	BI 3	24VAC		70 - 90 TON UNITS
Furnace Model #1 Status	BI 4	24VAC		GAS HEAT, 1 MODULE
Furnace Model #2 Status	BI 5	24VAC		GAS HEAT, 2 MODULE
Furnace Model #3 Status	BI 6	24VAC		GAS HEAT, 3 MODULE
G (fan)	BI 7	24VAC		ALL
Occupied/Unoccupied Switch	BI 8	24VAC		ALL
Shutdown	BI 9	24VAC		ALL
Smoke Purge	BI 10	24VAC		ALL
Supply Fan Status (fan proving)	BI 11	24VAC		ALL
Filter Status (dirty filter)	BI 12	24VAC		DFS OPTION
Evaporator Freezestat	BI 13	24VAC		W/O HGBP
HW Freezestat	BI 14	24VAC		HW
Cool-Heat COR Status	BI 15	24VAC		ALL
VFD Bypass Input	BI 16	24VAC		VAV W/ VFD BYPASS
Supply Fan VFD	AO 1	0-10V	0 to 100%	VAV
Exhaust Fan VFD or Damper	AO 2	0-10V	0 to 100%	POWERED EXHAUST
OA / RA Damper & Full AMS	AO 3	0-10V	0 to 100%	ALL
OAD #1 MIN and 25/75 AMS	AO 4	0-10V	0 to 100%	AMS (ALL OPTIONS)
OAD #2 MIN and 25/75 AMS	AO 5	0-10V	0 to 100%	AMS (1/4 - 3/4 ONLY)

Continued on Next Page

NOTES:
AI = Analog Input
BI = Binary Input
AO = Analog Output
BO = Binary Output

TABLE 33 – INPUT/OUTPUT TABLE (CONTINUED)

I/O NAME	INPUT/OUTPUT TYPE	SIGNAL LEVEL	APP VALUE RANGE	APPLICATION
Heating Valve	AO 6	0-10V	0 to 100%	HW
Cooling/Heating Stage #1	BO 1			ALL
Cooling/Heating Stage #2	BO 2			ALL
Cooling/Heating Stage #3	BO 3			ALL
Cooling/Heating Stage #4	BO 4			ALL
Cooling/Heating Stage #5	BO 5			70 - 90 TON UNITS
Cooling/Heating Stage #6	BO 6			70 - 90 TON UNITS
Cool/Heat Changeover Relay	BO 7			ALL
Supply Fan	BO 8			ALL
Exhaust Fan	BO 9			POWERED EXHAUST
VAV Heat Relay	BO 10			VAV

NOTES: AI = Analog Input
BI = Binary Input
AO = Analog Output
BO = Binary Output