Controls, Start-Up, Operation and Troubleshooting

CONTENTS

SAFETY CONSIDERATIONS

Installing, starting up, and servicing this equipment can be hazardous due to system pressures, electrical components, and equipment location. Only trained, qualified installers and service mechanics should install, start up, and service this equipment.

When working on this equipment, observe precautions in the literature, on tags, stickers, and labels attached to the equipment, and any other safety precautions that apply. Follow all safety codes. Wear safety glasses and work gloves. Use care in handling, rigging, and setting this equipment, and in handling all electrical components.

⚠ WARNING

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation and service. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

⚠ CAUTION

This unit uses a microprocessor-based electronic control system. *Do not* use jumpers or other tools to short out components, or to bypass or otherwise depart from recommended procedures. Any short-to-ground of the control board or accompanying wiring may destroy the electronic modules or electrical components.

⚠ WARNING

DO NOT USE TORCH to remove any component. System contains oil and refrigerant under pressure.

To remove a component, wear protective gloves and goggles and proceed as follows:

a. Shut off electrical power to unit.
b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
c. Traces of vapor should be displaced with nitrogen and the work area should be well ventilated. Refrigerant in contact with an open flame produces toxic gases.
d. Cut component connection tubing with tubing cutter and remove component from unit. Use a pan to catch any oil that may come out of the lines and as a gage for how much oil to add to the system.
e. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Failure to follow these procedures may result in personal injury or death.

⚠ CAUTION

DO NOT re-use compressor oil or any oil that has been exposed to the atmosphere. Dispose of oil per local codes and regulations. DO NOT leave refrigerant system open to air any longer than the actual time required to service the equipment. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be completed. Failure to follow these procedures may result in damage to equipment.

GENERAL

This publication contains Controls, Operation and Troubleshooting information for the 50XJ units. The Omnizone™ packaged units are self-contained, water-cooled indoor units for use in VAV (variable air volume) applications. Units are equipped with Carrier multi-protocol controls. Refer to the unit Installation Instructions for unit layout.

MAJOR SYSTEM COMPONENTS

Controller Processor 6126 (PCB1) — The central processing unit for the Omnizone system control is the UC Multi-Protocol XP. The controller provides general purpose HVAC (Heating, Ventilation and Air Conditioning) control and monitoring capability in a stand-alone or network environment using closed-loop, direct digital controls. The controller has been pre-programmed to work in either stand-alone or BACnet*, MODBUS†, or Johnson N2 network system installations. The controller will also operate on a LonWorks** network with an accessory LON-OC board installed.

The controller is designed to provide heating and cooling control, loop control, scheduling, and custom programming. The main processor provides 24 field points (12 universal inputs, 6 relay outputs, and 6 analog outputs). Additional points are provided by the I/O (input/output) modules. Table 1 lists the control inputs and outputs for all modules.

Specifications for the Multi-Protocol Controller may be found in the Open System literature.

I/O Flex Module 8160 (PCB2) — This input/output module is factory-installed and allows additional factory and field points (16 inputs and 8 outputs).

The module provides the following inputs: outdoor-air temperature (accessory), leaving-water temperature (accessory), tower sump temperature (accessory), mixed-air or return-air temperature (factory), water economizer freeze sensor (option) or freeze thermostat (accessory), entering water temperature (option), enthalpy sensor (accessory), filter status switch (option), phase rotation monitor (option), condenser water flow switch (option), and compressor status (factory).

This module provides the following field digital outputs: heat interlock (HIR), VAV terminal control (TRMCT), ventilation request (VENTR), VAV terminal open (TRMOP), pump request, tower request, and external dehumidification.

Local Interface Display — The BACview interface display is mounted on the front of the 50XJ units. A number of user-adjustable features are entered/changed using the display keypad. These features described in detail in the Control and Display section of this manual.

Control Module Communication — When power is applied to the Omnizone™ system control panel, green power LED (light-emitting diode) lights. Once the control program initializes, the green RUN LED on each module should flash on/off about twice a second and the red error (ERR) LED should be off. The green Tx/Rx LEDS flicker when data is communicated over the network. The green Tx/Rx LEDS near the Xnet remote expansion port flicker when the main board and the expansion board are communicating.

PCB Addresses — Rotary switch 1 (SW1) is used to set each controller's address, as well as the input/output module address. Individual jumpers on each board are used to configure the input point type. For more information, refer to Table 1 and the Optional and Field-Installed Accessory Sensors/Devices section.

Optional and Field-Installed Accessory Sensors/ Devices — These units can be ordered with options and accessories that add functionality and control. These options and accessories are used as described below.

NOTE: The control software includes all PCB1 and PCB2 functions, and most of the sensors/devices associated with those functions are factory installed. However, some sensors/ devices must be field-connected to the proper terminal.

REMOTE OCCUPANCY CONTROL (PCB1) — This control is a field located switch, controller or timer input which, when activated, tells system when to switch from unoccupied to occupied mode.

When in occupied mode, the unit turns on the supply fan and controls supply fan speed to maintain a duct static set point measured at the duct static pressure sensor (DSP). The unit operates to provide conditioning to a set point. When in unoccupied mode, the unit provides no cooling/heating, or controls to a 'setback' set point.

FIRE ALARM (PCB1) — The fire alarm is a normally closed, dry contact input that causes the controller to shut the system down in the event of a fire.

CONDENSER WATER FLOW SWITCH (PCB2) — This flow switch is located in the unit waterline to ensure that there is water flow before allowing the unit to start the compressor(s). Compressor operation and economizer cooling is disabled when no flow is detected. These remain disabled until water flow is again detected.

The factory-installed water flow switch on the 50XJ unit is a thermal dispersion type switch located inside the unit cabinet.

HEAT INTERLOCK OUTPUT (PCB2) — This output is activated whenever heating is activated, commanding the VAV dampers to operate in heating control mode.

NOTE: In order for this output to function, the terminal occupied output must also be on.

TERMINAL CONTROL (PCB2) — Terminal control is activated to command VAV dampers to control to the cooling set point. Terminal control must be on along with heat interlock for heating set point control to function.

EXTERNAL RESET INPUT (PCB1) — This modulating input (0 to 10 vdc) allows remote adjustment (upward) of the supply air temperature (SAT) sensor set point. The default external reset input setting is 55 F. This variable input can raise the set point by up to 20 F for a full-range input signal or to any point in between.

WATER ECONOMIZER COIL (PCB2) — This factory-installed option contains a water-to-air coil, two (2) electronic motorized water valves, and related piping. Control of the water economizer also requires a mixed/return air temperature sensor, an entering water temperature sensor and an economizer freezestat sensor or switch.

The electronic motorized water valves are each controlled by the unit controller via separate 2 to 10 vdc variable signals to define variable valve position.

* Sponsored by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).
† Registered trademark of Schneider Electric.
** Registered trademark of Echelon Corporation. Requires additional hardware card.

Table 1 — Control Inputs and Outputs

DESCRIPTION	ABBREV.	TYPE	I/O NO.	JUMPER SETTINGS
INPUTS				
MAIN CONTROLLER (PCB1)				Aux. Pwr Out: 24V
Refrigerant Pressure (Cir. no. 1)	PRES	0-5V; Internally Powered	UI-01	IN01: 0-10V
Duct Static Pressure	DSP	4-20mA; Internally Powered	UI-02	IN02: 0-20mA
Duct High Static Limit Switch	DHS	Switch Closure	UI-03	IN03: RTD/Dry/Therm
Supply Air Temperature	SAT	Analog; 10K-2 Sensor	UI-04	IN04: RTD/Dry/Therm
unassigned	–	–	UI-05	IN05: RTD/Dry/Therm
Space Zone Sensor (analog)	SPT	Analog; 10K-2 Sensor	UI-06	IN06: RTD/Dry/Therm
Indoor Air Quality	IAQ	Analog; 0-10V,Ext Powered	UI-07	IN07: 0-10V
Indoor Relative Humidity	IRH	Analog; 0-10V,Ext Powered	UI-08	IN08: 0-10V
Building Static Pressure	BSP	Analog; 0-10V,Ext Powered	UI-09	IN09: 0-10V
External Reset	RESET	Analog; 0-10V,Ext Powered	UI-10	IN10: 0-10V
Remote Occupancy	RMTOCC	Switch Closure	UI-11	IN11: RTD/Dry/Therm
Fire Alarm/Shutdown	FSD	Switch Closure	UI-12	IN12: RTD/Dry/Therm
I/O BOARD (PCB2)				
Compressor 1 Status	CR1	Switch Closure	IN-01	
Compressor 2 Status	CR2	Switch Closure	IN-02	
Compressor 3 Status	CR3	Switch Closure	IN-03	
Compressor 4 Status	CR4	Switch Closure	IN-04	
Condenser Water Flow Switch	CDWF	Switch Closure	IN-05	
Phase/Rotation Monitor	PHASE	Switch Closure	IN-06	
Filter Status Switch (Dirty Filter Detect)	FLTS	Switch Closure	IN-07	
Differential Enthalpy	ENTH	Switch Closure	IN-08	
unassigned	–	–	IN-09	IW9:Therm/Dry
Entering Water Temperature	EWT	Analog; 5K Sensor	IN-10	W8:Therm/Dry
Water Econ Freezestat Sensor or Switch	FREEZE	Analog; 10K-2 Sensor or Switch Closure	IN-11	IW7:Therm/Dry (configurable)
Mixed/Return Air Temperature	MA_RA	Analog; 10K-2 Sensor	IN-12	IW6:Therm/Dry
Tower Sump Temperature	TWRTEMP	Analog; 10K-2 Sensor	IN-13	IW5:Therm/Dry
Leaving Water Temperature	LWT	Analog; 10K-2 Sensor	IN-14	IW4:Therm/Dry
Outdoor Air Temperature	OAT	Analog; 10K-2 Sensor	IN-15	IW2:Therm/Dry
unassigned	–	–	IN-16	IW1:Therm/Dry
BINARY OUTPUTS				
MAIN CONTROLLER (PCB1)				
Compressor 1		Relay; Form C	BO-01	
Compressor 1		Relay; Form C	BO-02	
Compressor 1		Relay; Form C	BO-03	
Compressor 1		Relay; Form C	BO-04	
VFD Bypass Start/Stop or CV Fan Start/Stop	BPS_S	Relay; Form C	BO-05	
Field Alarm Connection	Alarm	Relay; Form C	BO-06	Field Use
I/O Board (PCB2)				
Heat Interlock Relay	HIR	Relay; Form A (N.O.)	BO-01	
VAV Terminal Control	TRMCT	Relay; Form A (N.O.)	BO-02	
Ventilation Output	VENTR	Relay; Form A (N.O.)	BO-03	
VAV Terminal Open	TRMOP	Relay; Form A (N.O.)	BO-04	
Water Pump Request	PUMP	Relay; Form A (N.O.)	BO-05	
Tower Request	TOWER	Relay; Form A (N.O.)	BO-06	
External Humidify/Dehumidify	HUMID_OUT	Relay; Form A (N.O.)	BO-07	
unassigned	–	Relay; Form A (N.O.)	BO-08	
ANALOG OUTPUTS				
MAIN CONTROLLER (PCB1)				
VFD Speed Control	VFD	0-10V	AO-1	
Modulating Valve Econ./Head Pressure Control	MVLV	0-10V	AO-2	
2-Position/Reverse Operation Valve or Air Economizer	ECONO	0-10V	AO-3	
Heating Output	HEAT	0-10V	AO-4	
Modulating Exhaust Fan	EXH	0-10V	AO-5	
unassigned	–	0-10V	AO-6	

LEGEND

AO — Analog Output
BO — Binary Output
CV — Constant Volume
I/O — Input/Output
N.O. — Normally Open
RTD — Resistance Temperature Detector
VAV — Variable Air Volume
VFD — Variable Frequency Drive

The mixed/return air sensor (MA_RA) is an air temperature sensor located in the unit between economizer coil and evaporator.

The entering water temperature sensor (EWT) is a probe type sensor inserted into a copper stub at the unit water inlet connection.

The 50XJ units can be connected to two types of building water systems: variable and fixed or constant flow control. In either case, the economizer water valves are opened whenever there is a call for cooling and the inlet water temperature is colder than the econimizer lockout set point.

Dependencies — Water economizer option is enabled, fan is on, and inlet water temperature is below set point; or from "remote scheduler," or from "remote linkage."

Economizer mode is switched to off or no start if there is no condenser water flow, fire input is on, fan is not on, or the unit is in unoccupied mode.

Variable Waterflow Systems — Whenever water economizer is off, the economizer flow control valve is fully closed and the reverse flow valve directly to the condenser is fully open. Upon engagement of the water economizer, the economizer flow control valve should be controlled to maintain the mixed air temperature as sensed by the MA-RA sensor, located between the economizer coil and the DX (direct expansion) cooling coil at a temperature near the supply air set point. The the reverse flow valve will be controlled in reverse of the economizer flow control valve's position. The following formula is an example: reverse/head press ctrl output = 100 – two-position/econo output.

When the unit is off, both valves are closed.

Constant Waterflow Systems — Control of the economizer flow control valve is same as for variable waterflow systems. Control of the reverse flow control valve position will inversely track the economizer flow control valve, such that the total sum of the two valves open positions always equals 100%. The only difference between the variable waterflow system and the constant waterflow system is that for the constant flow system when the unit is off, the economizer valve will be closed and the reverse flow control valve will be open.

HEATING COILS AND VALVE (PCB1) — Water or steam heating options are factory installed. The water or steam control valve should be installed outside the unit.

HEATING - ELECTRIC HEAT (PCB1) — The controller provides a 0 to 10 vdc signal to control remote electric heat. A field-installed step sequencer can be used to convert this signal in to 2, 4 or more heating stages.

A single controller output is used to drive either a hydronic heating coil or the electric heat, so without field modifications, these are mutually exclusive options.

HEAD PRESSURE CONTROL (PCB1) — Head pressure control is required for unit installations that will experience entering condenser water temperatures of 55 F or lower.

NOTE: Head pressure control is not needed or used in conjunction with a water economizer. A refrigerant pressure transducer monitors head pressure on compressor circuit 1, allowing the unit main controller to regulate water flow rate in main water line entering the unit (flow to all condensers). (Water header design to the condensers will be optimized such as to provide relative flow rates to each condenser based on its compressor capacity, enabling successful waterflow control at the main entering pipe.) There are two possible water valve configurations, as outlined below.

Pressure transducer input is factory installed in the discharge line of compressor circuit 1. It is provided 5 vdc by the unit main controller and returns a signal 1 to 5 vdc linearly. The sensor's range is 0 to 550 psig.

Water Valve(s) Control

Variable Building Waterflow Systems — Variable waterflow configurations use only one water valve in the main water supply pipe. The factory-installed valve is a normally open motorized variable control type. The valve is controlled by a 2 to 10 vdc signal from the main unit controller using the reverse/head pressure control output, which modulates to maintain the head pressure set point.

Constant Building Waterflow Systems — Constant waterflow configurations use two (2) water valves, only one of which is in the main water supply pipe. The second valve is located in a bypass pipe to the main outlet water pipe branched off of the supply pipe immediately ahead of the first valve. This valve is same type, but normally closed and is controlled in unison with the first valve, but opposite position, such that the total opening of the 2 valves always equals 100%.

VFD BYPASS (PCB1) — The variable frequency drive (VFD) bypass option provides backup for the VFD in VAV units. The bypass includes a control switch to select across-the-line operation or operation through the VFD. When the bypass is switched to across-the-line operation, the fan will not start until the user indicates that the VFD access doors are secure via the BACview keypad. The controller provides an output to signal the remote VAV dampers to open fully before the fan is started at full speed. A duct high static (DHS) switch shuts down the fan if the duct static exceeds the switch setting.

VENTILATION OUTPUT (PCB2) — The ventilation output is a controller output signal (available for field connection) to a field-supplied ventilation damper(s). This signal is activated whenever the unit is in the occupied mode.

SPACE TEMPERATURE SENSOR (PCB2) — A field-supplied Carrier space temperature sensor is required to maintain space temperature in sensor mode.

SUPPLY AIR RESET — Supply air temperature set point may be reset using one of several sensors. In the case of multiple sensors and configurations, the precedence of sensor use is from the top of the list to the bottom:

- EWT (PCB2) — EWT sensor installed, entering water temperature reset configuration on
- SPT (PCB1) — Space reset configuration on
- MA_RA (PCB2) — Configured for return air sensing

EXHAUST FAN CONTROL OUTPUT (PCB1) — This output is activated whenever the unit is in the occupied mode. This is a 0 to10 vdc output that controls based on the building pressure input set point.

CONDENSER WATER PUMP REQUEST (PCB2) — This relay output (provided for field connection) is used to start/stop the remote condenser water pump. This output is engaged when the unit is in cooling mode and the supply fan is operating. This output is also engaged if the economizer freeze protection is activated.

WATER TOWER REQUEST (PCB2) — This relay output (provided for field connection) is used to start/stop a remote water cooling tower. This output is engaged when the unit is in cooling mode and the supply fan is operating.

PHASE LOSS/REVERSAL PROTECTION SWITCH (PCB2) — A phase loss/reversal switch may be installed to detect over/under voltage conditions and phase loss or reversal. This is a factory-installed option. This switch monitors the unit power supply leads to detect phase loss or reversal. If the switch detects improper phasing, an input is sent to the unit controller, which shuts the unit down. When the switch opens, the controller outputs are forced off, the alarm output will close, the red alarm lamp will be lit on the BACview display, and a system alarm will be generated. Unit reset is automatic when the voltage and power phases have been restored.

FREEZE THERMOSTAT (FREEZ) (PCB2) — The economizer freezestat, used in conjunction with an optional water

economizer coil or heating coil, is a factory-installed averaging air temperature sensor positioned in the unit inlet airstream. This may be either a thermistor sensor (automatic reset) or a switch with capillary tube (manual reset). The unit activates freeze protection when the sensed air temperature falls below 37 F. In freeze conditions, the supply fan will be stopped, all compressors will stop, the economizer valve will open to 100%, the pump request output will remain on, and the alarm lamp will light. This will maintain condenser water flow through the coil to prevent freezing the coil while stopping all other operations that could have contributed or will be affected by the freeze condition. Unit reset is automatic when the contacts on the freeze protection switch close again OR when the thermistor sensed air temperature exceeds 42 F.

TOWER SUMP TEMPERATURE SENSOR (PCB2) — This field sensor is used for monitoring (only) the tower sump temperature.

LEAVING WATER TEMPERATURE SENSOR (PCB2) — This sensor is used only for monitoring the leaving water temperature.

BUILDING STATIC PRESSURE SENSOR (PCB1) — This sensor is used to control the speed of the building exhaust fan to maintain the building static pressure.

BUILDING EXHAUST FAN SPEED CONTROL (PCB1) — This output controls building exhaust fan speed.

INDOOR AIR QUALITY (CO_2) SENSOR (PCB1) — This sensor monitors CO_2 levels and is used to provide demand ventilation override with an air economizer.

OUTDOOR AIR TEMPERATURE SENSOR (PCB2) — This sensor is used to monitor outdoor-air temperature. When an air economizer is installed, this is used for changeover and lockout.

INDOOR RELATIVE HUMIDITY SENSOR (PCB1) — This sensor monitors the indoor relative humidity and controls the humidity control relay.

HUMIDITY CONTROL RELAY (PCB2, DEHUMIDIFY) — This relay controls a humidifier or dehumidification device.

Wiring Control Devices — Standard controls for the 50XJ unit require no field wiring. Standard 50XJ controls include: supply-air temperature (SAT), duct static pressure (DSP), duct high static limit switch (DHS), compressor status relays (CRx), supply fan control (BPS_S and/or VFD), and mixed-air/return-air sensor (MA_RA).

NOTE: The MA_RA sensor will be located in the return airsteam if the unit does not have a water economizer, and in the mixed airstream if the unit is equipped with a water economizer.

EXTERNAL 0 TO 10 VOLT DC RESET SIGNAL (RESET, PCB1) — This field-supplied 0 to 10 vdc signal is used to reset the supply-air temperature. The controller will scale the signal to provide 0 reset at 0 volts and 20 degrees of reset at 10 volts. Wire the positive of the signal to controller terminal block J4, terminal 16 and the negative to terminal 17.

SUPPLY AIR RESET BY SPACE TEMPERATURE — Use a 10K-type II thermistor sensor installed at the entering water temperature sensor location on PCB2 and configure the unit to control reset by the entering water temperature sensor OR use the normal space temperature sensor as described below. These sensors may be connected in a series-parallel network in the same manner as the space temperature sensor.

SPACE TEMPERATURE SENSOR (PCB1) — The space temperature sensor (33ZCT55SPT) is used in the following cases:

- When using the optional water economizer
- To determine the average temperature of the space served
- To determine supply-air temperature reset, occupied heating, unoccupied heating and cooling (refer to Sequence of Operation in Operation section).

To wire the sensor, perform the following (see Fig. 1).

1. Identify which cable is for the sensor wiring.
2. Strip back the jacket from the cable for at least 3 inches. Strip 1/4-in. of insulation from each conductor. Cut the shield and drain wire from the sensor end of the cable.
3. Wire the sensor to controller terminal block J4, terminals 9 and 10. A typical 10K thermistor such as the 33ZCT55SPT sensor may be used. If the SPT sensor is not installed and the MA_RA (mixed air/return air) sensor is configured for return air, the 50XJ unit will use this sensor to control supply air reset, occupied heat, and unoccupied heating and cooling. See Fig. 2 for space temperature sensor averaging.

HOT WATER OR STEAM VALVE (HWV, PCB1) — The controller supplies a 0 to 10 vdc control signal for hot water or steam valve control or electric heat control in occupied and unoccupied heat modes. A field-installed step sequencer is required to convert this signal into 2, 4 or other stages of electric heat. The positive signal is on terminal block J9, terminal 7, with the signal common (negative) on terminal 8.

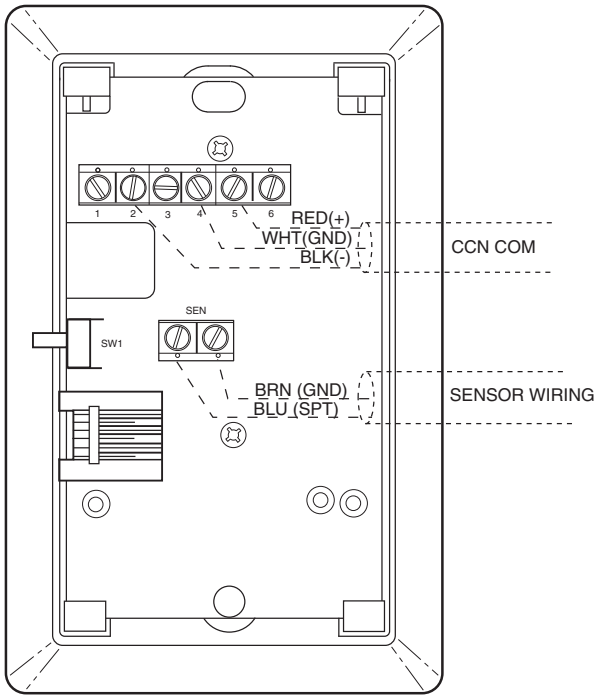


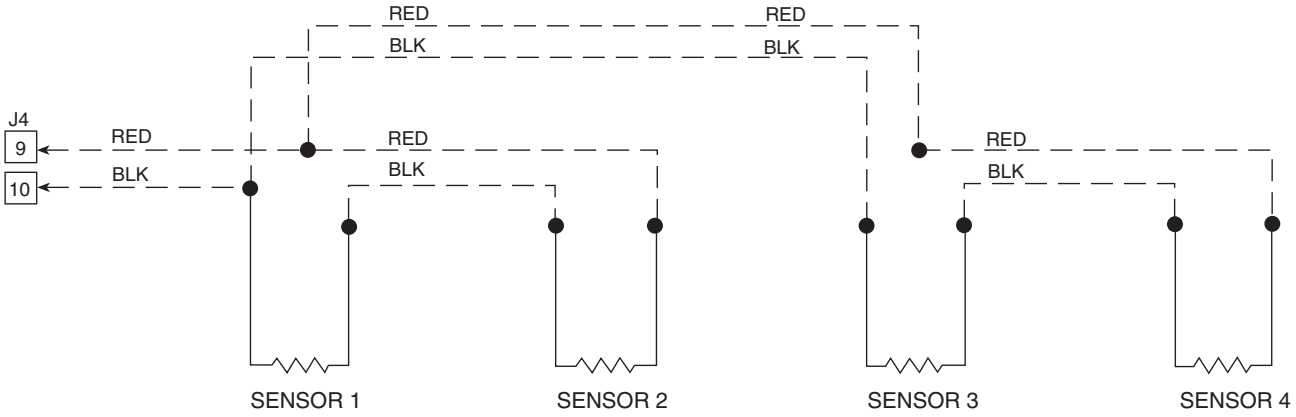
Fig. 1 — Space Temperature Sensor Typical Wiring (33ZCT55SPT)

AIR TERMINALS AND FRESH AIR DAMPER (PCB2) — The VAV terminal open (TRMOP), ventilation output (VENTR), VAV terminal control (TRMCT), and heat interlock relay (HIR) terminals provide dry contacts to command the VAV terminals open; a ventilation damper open; VAV terminals to control to their cooling set points; and VAV terminals to control to their heat set points, respectively. These contacts are located on terminal block J5: TRMOP terminals 7 and 8, VENTR terminals 5 and 6, TRMCT terminals 3 and 4, and HIR terminals 1 and 2.

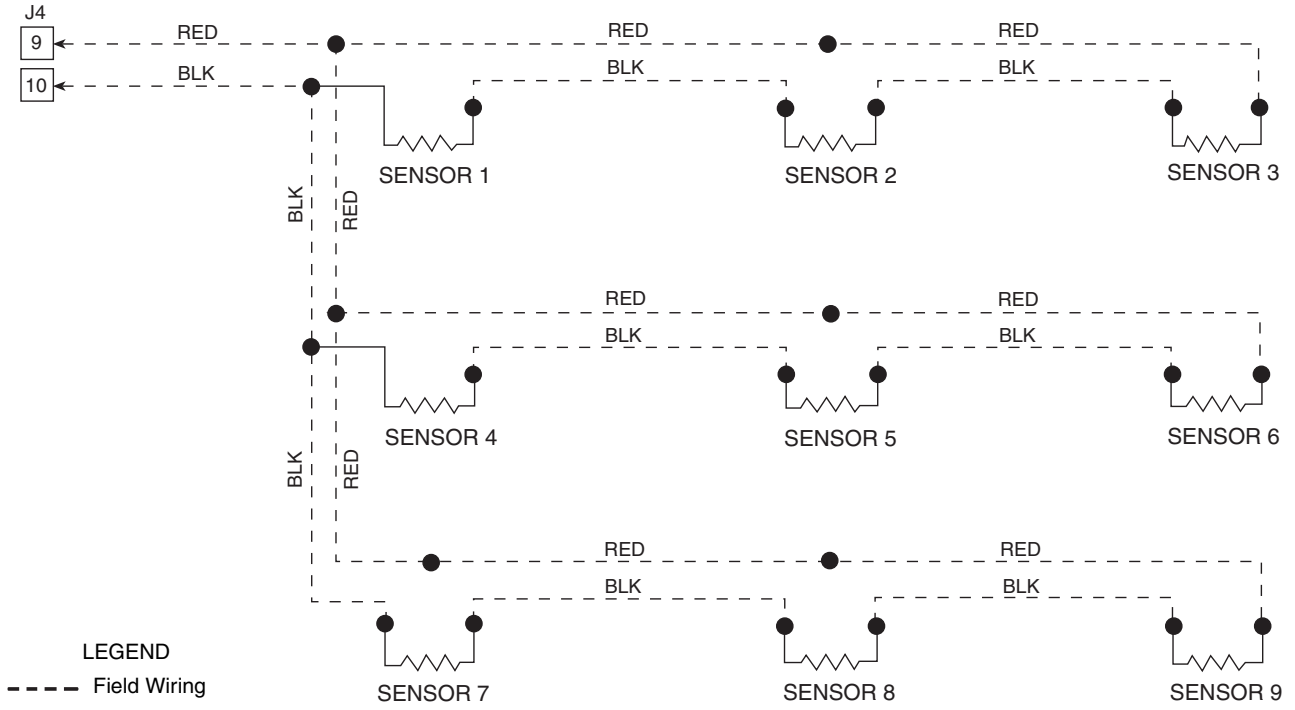
REMOTE OCCUPANCY (PCB1) — The unit may be commanded by a remote control system or a twist timer to become occupied and run when a set of dry contacts close. To enable remote occupancy control, configure the occupancy point in BACview to "remote (DI) on/off" and wire the remote contacts to terminal block J4, terminals 17 and 18.

SMOKE DETECTOR/FIRE ALARM SHUTDOWN (FSD) (PCB1) — To allow a smoke detector to shut the unit down, remove the jumper from terminal block J4, terminals 19 and 20 and wire these terminals to a set of normally closed contacts on the smoke detector.

ALARM (ALARM) OUTPUT (PCB1) — A Form C dry contact is provided to signal when the controller has an active alarm. To use these for remote annunciation, connect wiring to terminal block J10, terminal 18 (normally open), terminal 17 (common), and/or terminal 16 (normally closed).



SPACE TEMPERATURE AVERAGING — 4 SENSOR APPLICATION



SPACE TEMPERATURE AVERAGING — 9 SENSOR APPLICATION

Fig. 2 — Space Temperature Averaging

CONTROL AND DISPLAY

Controller — The microprocessor-based controller provides complete system control of unit operation. See Fig. 3 for typical controller components. The controller monitors all system sensors and makes operating decisions based upon the user's configuration inputs. See Fig. 4.

A scheduling function, programmed by the user, controls the occupied/unoccupied schedule. Up to 4 daily schedules, 12 holiday schedules, and 2 override schedules may be programmed.

Local access to the microprocessor control may be accomplished via the BACview keypad/display unit (BV6H). See Fig. 3. Recommended application is one BACview display per jobsite.

The microprocessor control is capable of operating in a stand-alone control mode and also supports communications with BACnet, Modbus, and optionally LonWorks building automation protocols.

In addition, the microprocessor control has the following features:

- simple access to set points, time schedules, status values, and unit configuration parameters
- alarm conditions are indicated via an alarm LED (light-emitting diode) and/or an audible signal
- password protection
- compressor minimum off time (5 minutes) feature
- service diagnostic mode
- field-installed room temperature sensor
- an on/off switch that may be used to cycle the controller
- a battery to maintain time and date in the event of a power outage (do not remove the battery when power is off)
- DIP switches to configure communication baud rate and protocol

The IO Flex 6126 controller has 6 binary outputs, 12 universal inputs and 6 analog outputs. Binary outputs have N/O (normally open) and N/C (normally closed) contacts used to turn components on or off. The universal inputs are used to monitor input from various sensors. These universal inputs can be set for one of three different sensor input types:

1. Voltage,
2. Temperature (thermistor) or discrete contact, or
3. Current.

There are 2 columns of jumpers to the left of the universal input plugs, see Fig. 4. The jumpers are used to configure the input to the desired type (voltage, temperature, etc.). The left row of jumpers are for the even numbered universal inputs, UI-12 thru UI-2 (top to bottom). The right column of jumpers are for the odd numbered universal inputs, UI-11 thru UI-1 (top to bottom). When the jumper is in the center position (default setting) the universal input is configured for temperature and discrete contact (digital input), such as duct high-limit switch. When the jumper is in the top position, the input is configured for a voltage input, for example, a humidity sensor. The bottom jumper position is used for milliamp input.

The following settings are made at the factory, see Fig. 5:

1. Auxiliary Power Output (Aux Pwr Out) jumper should be set on 24V to power the 0 to 10 vdc sensors.
2. Analog outputs (AO) labeled AO-1 and AO-2 should be set on Volts.
3. The module address (MAC) rotary switches are set for '01' from the factory. The MAC may be reconfigured in the field if required.

   NOTE: To download software to the I/O Flex 6126, the MAC setting must be on '01'.

   Example: If the control module's address is 01, point the arrow on the tens (10's) switch to 0 and the arrow on the ones (1's) switch to 1. See Fig. 4.

   NOTE: The I/O Flex 6126 recognizes its address only after power has been cycled.

The communication rate is factory-configured for 38.4 baud rate.

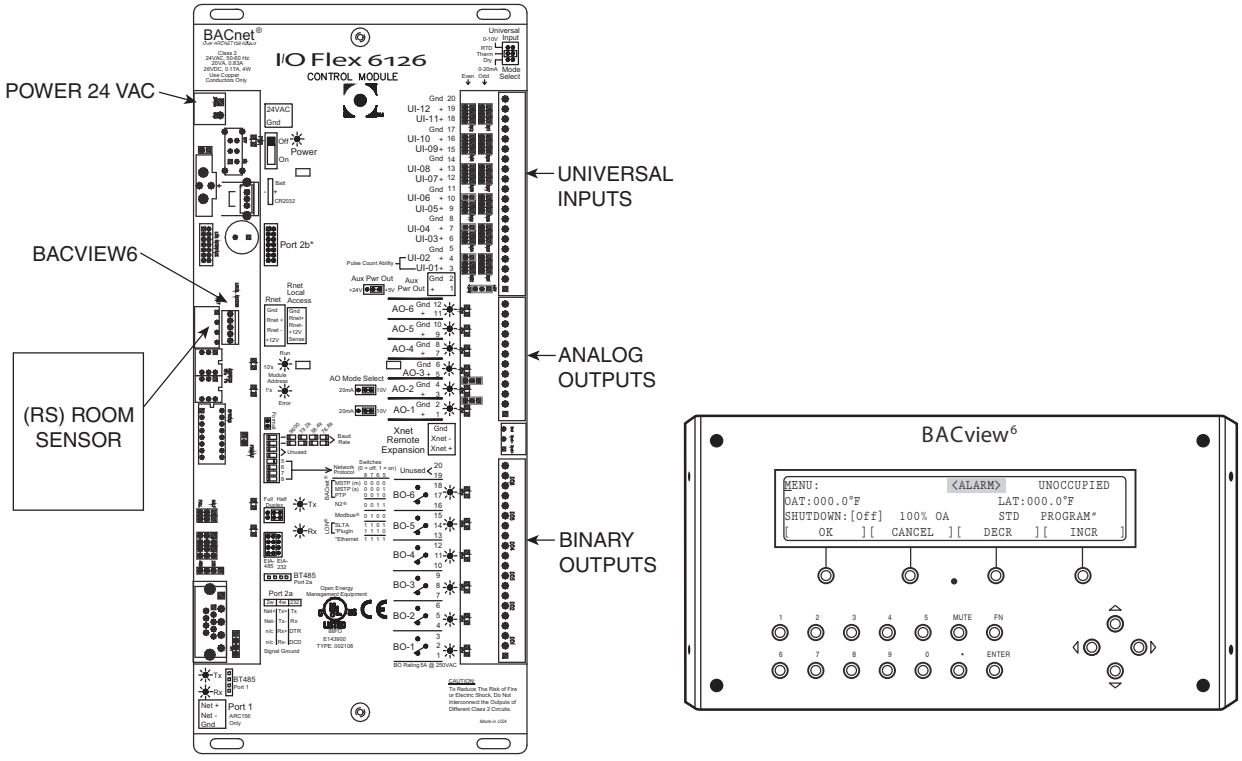


Fig. 3 — Typical Controller Components

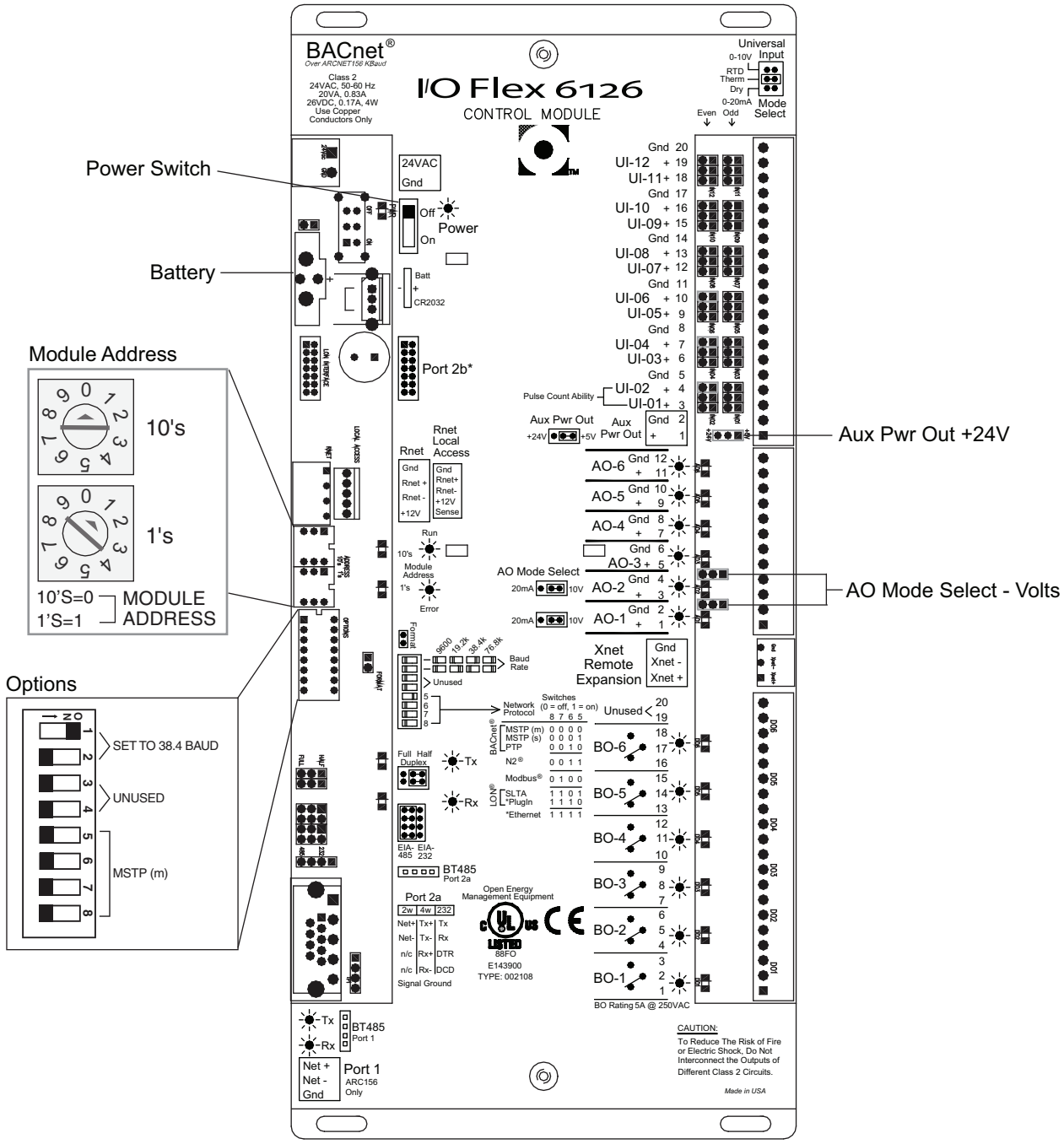


Fig. 4 — Control Module

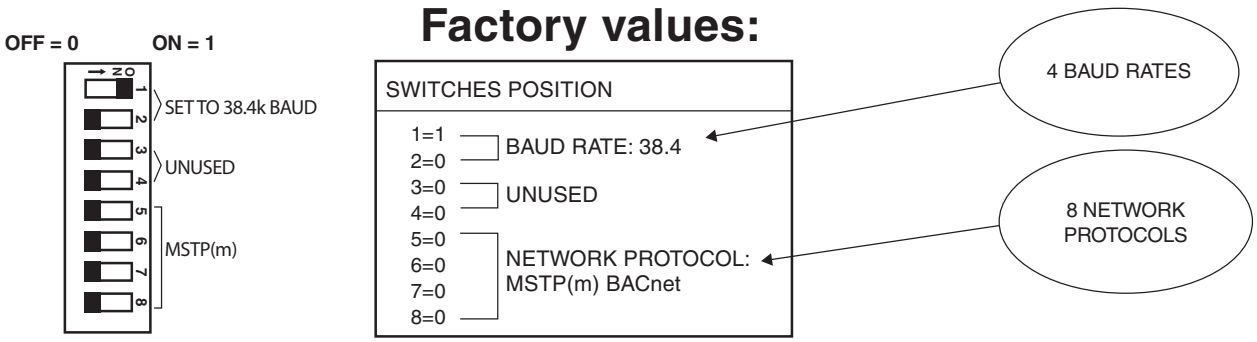


Fig. 5 — Control Module Switch Positions

BACview Interface Device — The BACview keypad/display features a numeric keypad, direction keys, four function keys, and a backlit LCD (liquid crystal diode) display. See Fig. 6. For specifications on BACview display see Table 2. The display is a large 4-line by 40-character display that is easy to read, even in low light conditions. The keypad/display has a padded backing and plugs directly into the controller using attached cable. See Fig. 6. To adjust the contrast of the display, turn the contrast screw on top of the BACview clockwise to lighten the display or counterclockwise to darken it. See Fig. 6.

The BACview screen goes dim after 10 minutes of inactivity. Press any key except MUTE or FN to activate the screen. The user can change the length of inactivity on the KEYPAD screen.

Table 2 — BACview Specifications

FEATURE	SPECIFICATION
Power	Supplied by the Rnet port througt the cable (+12 vdc at 250 mA)
Display	4-line by 40-character backlit LCD display, alarm LED and audible horn for alarm conditions
Protection	15 KV ESD protection to the enclosure.
Physical	Rugged aluminum enclosure for protection
Environmental Operating Range	32-120 F (0-48.9 C) 10-90% RH non-condensing
Overall Dimensions	Width: 9 5/8 in. (24.5 cm) Height: 4 15/16 in. (12.5 cm) Weight 1.5 lb (0.68 kg)
Listings	UL-916 (PAZX), CE (1997), FCC Part 15-Subpart B-Class A

Log On to BACview Display — It is not necessary to log onto the BACview display to view the unit status, component run times, etc. The user must log onto the display to change any set points or configuration values. If the user attempts to open a screen that requires a login and they have not already logged onto BACview, the LOGIN screen will appear. This logon follows the same process described below.

There are two logons for the BACview: Admin and User. Logging in at the User level allows all set points and scheduling to be changed, but a User cannot change either the User or Admin passwords or the unit configuration. The Admin logon allows all the functionality of a User, but adds the ability to change the User password, ability to change the router data and BACnet parameters, change the factory configuration, calibrate sensors, and initiate the unit self-test.

To log on to the BACview, perform the following procedure:

1. If the standby screen is visible, press any key to switch to the HOME menu.
2. If another screen is displayed, and there is no [LOGIN] softkey displayed, press the [HOME] softkey to switch to the HOME menu.
3. Press the [LOGIN] softkey.
4. The following prompt is displayed:

```
Admin or User
Password: [     ]
```

5. Use the numeric keys to enter the User or Admin password and then press <ENTER> or [OK].

   NOTE: The default Admin password is 1111.
6. If an invalid password is entered, the warning "horn" will chirp. After three failed login attempts the display switches back the screen where the [LOGIN] softkey was pressed.

Log Out of BACview Display — The system will automatically log the User or Admin out of the BACview display if no display key is pressed for 10 minutes. The inactivity timer can be adjusted through the "Keypad" screen.

1. If the standby screen is visible, press any key to switch to the HOME menu.
2. If another screen is displayed, press the [HOME] to switch to the HOME menu.
3. Press the [LOGOUT] softkey to force the system to log the user out. The text adjacent to the [LOGOUT] softkey changes to "LOGIN" when the user is logged out.

Change Default User Password — The user must log on to the BACview Display as ADMIN to change the user level password. Alternately, both USER and ADMIN passwords may be changed via network tools.

1. If the standby screen is visible, press any key to switch to the HOME menu.
2. If another screen is displayed, press the [HOME] to switch to the HOME menu.
3. Press the <right arrow> to scroll down through the HOME menu options. Move the cursor (brackets) over [UserPW], then press <ENTER>.
4. The following prompt is displayed:

```
View/Set User
Password: [     ]
```

5. The current user password is shown. Enter the new User password and then press <ENTER>, OR press [PREV] to leave the current password intact.

Automatic Self-Test — The controls are programmed with several automatic run tests that check connection and operation of major components. To perform the run test, verify that the alarm lamp is off. The red alarm lamp will light during the run tests and the run tests will cease if other alarms become active. Once an automatic test is started, the unit will remain in self-test mode for four minutes after all automatic run tests complete.

There are separate tests for each section of the unit: variable volume fan, bypass or constant volume fan, compressor cooling, heating, and water economizer.

To perform a self-test:

Turn unit power on.

1. Log on to the BACview display as ADMIN.
2. From the HOME menu, press the [CONFIG] softkey.
3. From CONFIGURATION menu, press [FACTORY] softkey.
4. From the FACTORY CONFIGURATION menu, press the [FACT TEST] softkey.
5. Press the <up arrow> or <down arrow> to select the test to run, then press <ENTER>.
6. Press the [INCR] softkey to initiate the test, then press <ENTER>. The test will start 2 seconds later.

The test will automatically end when the test sequence is complete. To manually halt a test, move the brackets to the test to stop and press <ENTER>. Press the [INCR] softkey to select Off, then press <ENTER>.

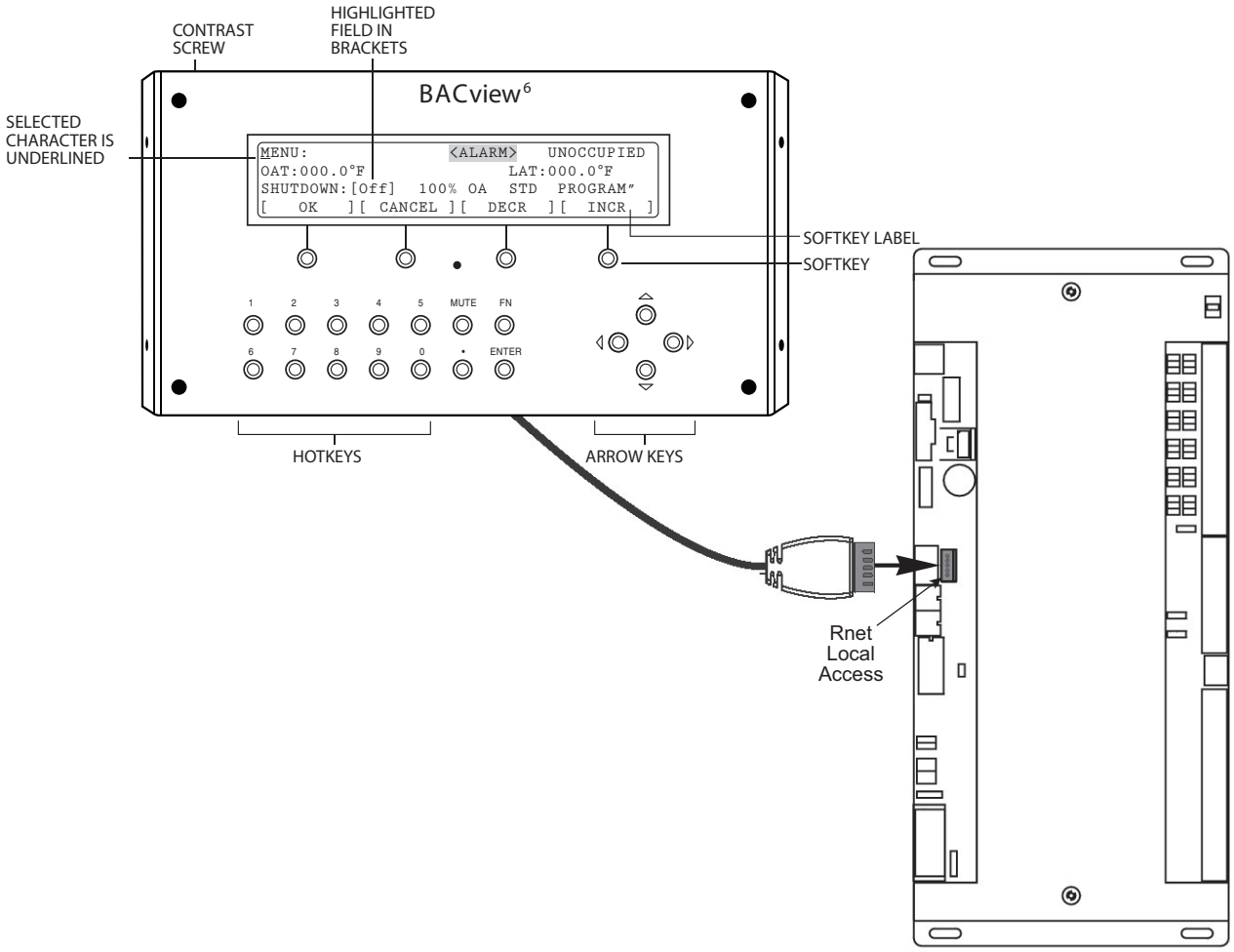


Fig. 6 — BACview Connection to Unit Controller

GENERAL TEST INFORMATION — The self-test routine requires the user to login with Admin access.

The self-test routines will NOT operate if there is an active alarm. If the user attempts to start a test with an alarm, the point will automatically switch from On to Off.

During the testing, the BACview alarm lamp will be on and the fans, compressors, and heating should halt operation, except during the applicable tests.

The self-test routines will halt if there is an active alarm.

The self-test routines will lock the unit into test mode for 4 minutes after the last test has completed.

At test start-up and at each test step, the alarm output relay will turn on for 2 seconds. The relay status is indicated by a red LED adjacent to the output.

VARIABLE VOLUME FAN TEST SEQUENCE (VAV UNITS ONLY) — The VAV fan test cannot be conducted while running the compressor start/stop test.

1. As the alarm relay closes, the supply fan should start and ramp up to 20% speed.
2. Thirty seconds after the test starts, the supply fan should ramp up to 35% speed.
3. After 60 seconds the test point should be off and the fan should stop.

CONSTANT VOLUME FAN TEST SEQUENCE (Non-VAV Units Only) — The airflow type (base configuration screen) should be set to constant. This test cannot be conducted while running the compressor start/stop test. This is the same test point used to test the VFD bypass.

Since constant volume units do not have remote VAV terminals, there is no built-in delay to allow remote boxes to open before starting the fan.

1. As the alarm relay closes, the supply fan should start at full speed.
2. After 5 seconds the test point should be off and the fan should stop.

VFD BYPASS TEST (VAV Units Only) — The airflow type (base configuration screen) should be set to variable. This test cannot be conducted while running the compressor start/stop test test.

The VFD bypass control switch must be set to line (bypass) mode.

The access panel secure (Access Panel SC) on the CNTL CONFIG screen must be set to yes to allow this test to operate.

1. As the alarm relay closes, the TRMOP output engages to signal the remote boxes to open.
2. Thirty econds after the test starts, the supply fan should start at full speed.
3. After 60 seconds the test point should be off and the fan should stop.

COMPRESSOR START/STOP TEST — This test operates each compressor, individually, for 5 seconds. If a compressor fault is detected for two continuous seconds, this test should terminate.

This test will operate the number of compressors indicated on the "# of Comps" section of the BASE CONFIG screen.

1. As the alarm relay closes, Compressor 1 starts and operates for 5 seconds.
2. One second after compressor 1 stops, compressor 2 starts and operates for 5 seconds.
3. One second after compressor 2 stops, compressor 3 (if configured) starts and operates for 5 seconds.
4. One second after compressor 3 stops, compressor 4 (if configured) starts and operates for 5 seconds.
5. After the last configured compressor stops, the test point returns to off.

HEATING — This test operates the analog output used to control a field-installed heating valve. The timing is set to allow the use of a DC voltmeter to check the controller output.

This test will NOT test electric heat. If the heat type indicated on the "Heat Config" section of the BASE CONFIG screen is set to "electric" this test will not run.

1. As the alarm relay closes, the heating output will be 0 vdc.
2. Ten seconds later the heating output moves to 5 vdc.
3. Ten seconds later the heating output moves to 10 vdc.
4. Ten seconds later the test point returns to Off and the heat output returns to normal control.

WATER ECONOMIZER (H2O ECON) — This test checks operation of the modulating valve (MVLV) and economizer valve (ECONO).

1. As the alarm relay closes, the output to both valves is 0 vdc. Both valves should close.
2. Two minutes later, economizer valve opens (10 vdc) and modulating valve remains closed (0 vdc).
3. Two minutes later, economizer valve closes (0 vdc) and modulating valve opens (10 vdc)
4. Two minutes later the test point returns to off and the valves return to normal control.

Set the Clock — The user must be logged on as either a User or Admin to set the clock. To set the clock, perform the following procedure:

1. From the HOME menu, press the arrow keys until the cursor brackets are around ClockSet, then press <ENTER>.
2. Use the arrow keys to scroll around the screen and select the data fields to change.
3. To change a field, move the cursor (brackets) to the desired field then press enter.
4. If the wrong field is entered or you do not want to change a value, press [CANCEL] to leave the current setting intact.
5. To setup Daylight Savings time and Standard time, move the cursor (brackets) over DST and then press <ENTER>. You can then scroll through and set the time of day to start daylight savings mode (default is 02:00), the amount of time to offset (default is 60 minutes), beginning (B) and ending (D) dates.

Configure Schedules — Local schedules are one method of starting and stopping the unit at specified intervals. There are four normal schedules that provide day to day operation. There are twelve holiday schedules that are used to override the normal schedule and set the unit to unoccupied mode. There are two override schedules that are used to override the normal and holiday schedules to force the unit into occupied mode.

The user must be logged on as User or Admin to configure the schedules using following procedure.

NORMAL (LOCAL) SCHEDULES

1. From the HOME menu, select the the [CONFIG] softkey to enter the CONFIGURATION menu.
2. Use the arrow keys to select OCCUPANCY, then press <ENTER>.
3. Press the [LOCAL] softkey to adjust the normal schedules.
4. Use arrow keys to scroll around the screen and select the data field to change. These buttons scroll through the data fields, as well as up and down the screen.
5. To change a field, move the cursor brackets to the desired field then press <ENTER>.
6. If the wrong field is entered or you do not want to change a value, press [CANCEL] to leave the current setting intact.
7. Press the [PREV] softkey to move the previous screen or schedule. Press the [NEXT] softkey to move to the next schedule screen.

   If viewed as a single large screen, the layout is displayed as follows:

```
---------- Schedule #1 ----------
Start Time   [hh:mm]   0:   0
End Time     [hh:mm]   0:   0
          Apply Times Above to
Mon  Tue  Wed  Thu  Fri  Sat  Sun
No   No   No   No   No   No   No

[->PREV]      [->NEXT]      [->HOME]
```

The time settings are in 24-hour time. The Start Time line is used to set the occupied start time. The End Time line is used to set the unoccupied start time. The "Apply Times Above to" section is used to set whether the schedule is active each day of the week. Select Yes to activate the schedule on a given day of the week and No to ignore the schedule on that day. The NEXT item at the bottom of screen moves you to the next normal schedule set point.

Setting the start time and end time to 0 hours and 0 minutes disables a schedule.

HOLIDAY SCHEDULES

1. From the HOME menu, select the [CONFIG] softkey to enter the CONFIGURATION menu.
2. Use the arrow keys to select OCCUPANCY, then press <ENTER>.
3. Press the [HOLIDAY] softkey to adjust the holiday schedules.
4. Use arrow keys to scroll around the screen and select the data field to change. These buttons scroll through the data fields, as well as up and down the screen.
5. To change a field, move the cursor brackets to the desired field then press <ENTER>.
6. If the wrong field is entered or you do not want to change a value, press [CANCEL] to leave the current setting intact.
7. Press the [PREV] softkey to move the previous screen or schedule. Press the [NEXT] softkey to move to the next schedule screen.

If viewed as a single large screen, the layout is as follows:

```
---------- Holiday Schedule #1 ----------
                Month  :  0
                Day    :  0
Start Time  [hh:mm]    0:    0
End Time    [hh:mm]    0:    0

[->PREV]    [->NEXT]          [->HOME]
```

The Month and Day entries select the month (1 to 12) and day (1 to 31) of the holiday. The time settings are in 24-hour time, with Start Time used to set the time of day to start of the holiday. The End Time line is used to set the end of the holiday. The NEXT item at the bottom of screen moves you to the next holiday schedule set point.

Setting the month or day or start time and end time to 0 disables the holiday schedule.

The holiday schedule cancels any normal schedule set for the holiday date and time. If a normal schedule is set from 0700 to 1800 hours and a holiday schedule is set for the same day from 0800 to 1700, the unit will be unoccupied from midnight to 0700. The unit will change to occupied mode at 0700 until 0800. At 0800 the holiday schedule forces the unit to unoccupied mode until 1700. At 1700, control returns to the normal schedule and the unit goes occupied from 1700 to 1800. At 1800, the unit returns to unoccupied mode per the normal schedule.

OVERRIDE SCHEDULES

1. From the HOME menu, select the [CONFIG] softkey to enter the CONFIGURATION menu.
2. Use the arrow keys to select OCCUPANCY, then press <ENTER>.
3. Press the [OVERRIDE] softkey to adjust the override schedules.
4. Use arrow keys to scroll around the screen and select the data field to change. These buttons scroll through the data fields, as well as up and down the screen.
5. To change a field, move the cursor brackets to the desired field then press <ENTER>.
6. If the wrong field is entered or you do not want to change a value, press [CANCEL] to leave the current setting intact.
7. Press the [PREV] softkey to move the previous screen or schedule. Press the [NEXT] softkey to move to the next schedule screen.

If viewed as a single large screen, the layout is as follows:

```
---------- Override Schedule #1 ----------
                Month  :  0
                Day    :  0
Start Time  [hh:mm]    0:    0
End Time    [hh:mm]    0:    0

[->PREV]    [->NEXT]          [->HOME]
```

The Month and Day entries select the month (1 to 12) and day (1 to 31) of the override. The time settings are in 24-hour time, with Start Time used to set the time of day to start of the override. The End Time line is used to set the end of the override. The NEXT item at the bottom of screen moves you to the next override schedule set point.

Setting the month or day or start time and end time to 0 disables the override schedule.

The override schedule has the highest priority of any schedule. When an override schedule is active, it overrides any normal or holiday schedule and forces the unit to occupied mode. In the example listed under the holiday schedule, assume an override schedule is set for 1300 to 1400 of that day. The unit operation remains the same, except the unit will switch to occupied mode from 1300 to 1400.

Adjust Set Points — The user must be logged on as User or Admin to configure set points.

1. From the HOME menu, select the [CONFIG] softkey to enter the CONFIGURATION menu.
2. Use the arrow keys to select SETPOINT, then press <ENTER>.
3. Use arrow keys to scroll around the screen and select the data field to change. These buttons scroll through the data fields, as well as up and down the screen.
4. To change a field, move the cursor brackets to the desired field then press <ENTER>.
5. If the wrong field is entered or you do not want to change a value, press [CANCEL] to leave the current setting intact.

See Table 3 for a description of the items on the SETPOINT menu.

Table 3 — Setpoint Menu

SET POINT	DEFAULT	RANGE
Duct Static Pressure (VAV Setpoint)	1.5 in. wg	0.05 to 3 in. wg
Supply Fan Proof Level (Fan On)	0.4 in. wg	0 to 0.5 in. wg
Occupied Cooling (Space)	74 F	(Occupied Heating +1) to 100 F
Occupied Heating (Space)	70 F	0 to (Occupied Cooling - 1) F
Unoccupied Cooling (Space)	85 F	(Unoccupied Heating +1) to 100 F
Unoccupied Heating (Space)	55 F	0 to (Unoccupied Cooling -1) F
Supply Air Cooling	55 F	50 to 70 F
Supply Air Heating	120 F	(Cooling Set point + 10) to 140 F
Supply Air Reset Ratio	3.0 F	1 to 10 F
Maximum Supply Air Reset	20 F	0 to 20 F
Refrig. Head Pressure	225 psig	200 to 300 psig
Economizer Lockout (Air Econ)	68 F	50 to 85 F
Air Econ Minimum Position	20%	0 to 100%
Indoor Air Quality	850 ppm	0 to 2000 ppm
Occupied Humidify	0% rh	0 to Occupied Dehumidify % rh
Occupied Dehumidify	100% rh	Occupied Humidify to 100% rh
Unoccupied Humidify	0% rh	0 to Unoccupied Dehumidify% rh
Unoccupied Dehumidify	100% rh	Unoccupied Humidify to 100% rh
Space Static Pressure	0.02 in. wg	0 to 0.3 in. wg
Space Static Sensor-Low	-0.5 in. wg	-1 to -0.2 in. wg
Space Static Sensor-RNG (range)	1 in. wg	0 to 2 in. wg
H2O Econ Flush Duration	12 min	3 to 20 minutes
H2O Econ Flush Interval	12 hrs	12 to 168 hours
T55 Time Override Hours	1 hour	0 to 24 hours

LEGEND

ppm — Parts Per Million
rh — Relative Humidity
VAV — Variable Air Volume

Configure Basic Unit — The user must be logged on as Admin to adjust these control configurations.

1. From the HOME menu, select the press the [CONFIG] softkey to enter the CONFIGURATION menu.
2. From the CONFIGURATION menu, press the [FACTORY] softkey to enter the FACTORY CONFIGURATION menu.
3. Use arrow keys to scroll around the screen and select the data field to change. These buttons scroll through the data fields, as well as up and down the screen.
4. To change a field, move the cursor brackets to the desired field then press <ENTER>.
5. If the wrong field is entered or you do not want to change a value, press [CANCEL] to leave the current setting intact.

See Table 4 for a description of the items on the FACTORY CONFIGURATION menu.

Table 4 — Factory Configuration Menu

POINT NAME	DEFAULT	OPTIONS
Occupancy Input Selection	Remote DI	Always Occupied Local Schedule BACnet Schedule BAS On/Off Remote DI
Airflow Type	Variable*	Constant or Variable
Number of Compressors	4*	2, 3, or 4
Heat Type	None*	None, Hydronic, Electric
Econ Water Flow Type	Constant*	Constant or Variable
Mixed/Return Sensor Type	None*	None, Mixed or Return
Water Econ Freeze Sensor Type	None*	None, Thermistor, or Switch
Entering Water Temp Sensor	None*	None or Installed
(Condenser) Water Flow Switch	None*	None or Installed
Modulating Water Valve	None*	None or Installed
Head Pressure Control	None*	None or Enabled

*These points are factory set to the appropriate value if affected by a factory-installed option.

Unit Configuration — The user must be logged on as Admin or User to adjust these configuration points.

1. From the HOME menu, select the press the [CONFIG] softkey to enter the CONFIGURATION menu.
2. From the CONFIGURATION menu, press the [UNIT] softkey to enter the second CONFIGURATION menu.
3. Use arrow keys to scroll around the screen and select the data field to change. These buttons scroll through the data fields, as well as up and down the screen.
4. To change a field, move the cursor brackets to the desired field then press <ENTER>.
5. If the wrong field is entered, do not change a value, press [CANCEL] to leave the current setting intact.

See Table 5 for a description of the items on the CONFIGURATION menu.

Table 5 — Configuration Menu

POINT NAME	DEFAULT	OPTIONS
Occupancy Input Selection	Remote DI	Always Occupied Local Schedule BACnet Schedule BAS On/Off Remote DI
VFD Access Panel Secure	No	No or Yes
Heat Type	None*	None Hydronic Electric
Occupied Heating Allowed	Yes	No or Yes
Allow Unoccupied Free Cooling	No	No or Yes
Allow Mechanical Dehumidification	No	No or Yes
Supply Air Reset by EWT (Entering Water Temperature)	No	No or Yes
Supply Air Reset by SPT (Space Temperature)	No	No or Yes
Water Econ Flush Type	Timed	Timed or Daily
Air-Side Economizer Installed	None	None or Installed
Outdoor Air Temp Sensor	None	None or Installed
Indoor Air Quality Sensor	None	None or Installed
Indoor Relative Humidity	None	None or Installed
Air-Econ Enthalpy Control	No	No or Yes
Space Static Pressure Control	No	No or Yes
Technician - Area Code	000	3-digit number
Technician - Prefix	000	3-digit number
Technician - Extension	0000	4-digit number

*These points are factory set to the appropriate value if affected by a factory-installed option.

Unit Status — The system status can be monitored without logging onto the BACview display by pressing the [Status] softkey on the HOME menu and using the arrow keys to navigate the screen.

See Table 6 for a description of the items on the on the UNIT STATUS menu.

Display / Set Runtime Alarms — It is not necessary to log onto the BACview display to view the compressor and fan run time values. It is necessary to log onto BACview to set runtime limits or clear the accumulated run times.

To view run times, press the [CONFIG] softkey on the HOME menu, then select the RUNTIME option from the CONFIGURATION menu. Use the arrow keys to scroll through the display.

To change runtime alarm values move to the column marked "Alarm" and press <ENTER> then use the numeric keys to enter the alarm value and again press <ENTER>. To reset the accumulated run time, move to the column marked "Clear", press <ENTER>, then the [INCR] softkey to select "Yes", then press <ENTER>. The display will prompt for the user or admin passwords if the operator is not already logged on to the display.

Display Alarms and Alarm History — It is not necessary to log onto the BACview to display the Current Alarms or the Alarm History. To view the Alarm information, press the [ALARM] softkey on the HOME menu.

Table 6 — Unit Status Menu

STATUS POINT	INDICATORS
Operating Mode	OFF Fan Only Economizer DX Cooling Heating Test Shutdown
Alarm Output	Off or On
Occupancy Status	Occupied or Unoccupied
Occupancy Control	Always Occupied Local Schedule BACnet Schedule BAS On/Off Remote DI
Fire/Shutdown Input	Ok or Alarm
Power Monitor	Ok or Alarm
Fan	Off or On
Fan Output	<value> %
VFD Bypass	Off or On
Duct Static Pressure	<value> in. wg
Duct Hi-Limit Switch	Ok or Alarm
Filter Status Switch	Ok or Alarm
Supply Air Temperature	<value> F
Cooling SAT Setpoint	<value> F
Heating SAT Setpoint	<value> F
External Cooling Reset	<value> vdc
Space Temperature	<value> F
Rnet Sensor	Inactive or Connected
Compressor 1 Status	Off or On
Compressor 2 Status	Off or On
Compressor 3 Status	Off or On
Compressor 4 Status	Off or On
Heating Capacity	<value> %
Condenser Water flow	Flow or No Flow
Refrigerant Pressure	<value> PSIG
Modulating Valve	<value> %
Water Economizer Valve	<value> %
Outdoor Air Damper	<value> %
VAV Terminal Open	Off or On
VAV Terminal Operate	Off or On
Heat Interlock Relay	Off or On
Ventilation Request	Off or On
Water Pump Request	Off or On
Tower Request	Off or On
Entering Water Temp	<value> F
Mixed/Return Air Temp	<value> F
Economizer Input	<value> F
Freeze Stat Input	Ok or Alarm
Outdoor Air Temperature	<value> F
Enthalpy Input	Ok or High
Indoor Air Quality Level	<value> ppm
Indoor Relative Humidity	<value> %
Humidity Output	Off or On
Space Static Pressure	<value> inches w.c.
Exhaust Fan Output	<value> %
Leaving Water Temperature	<value> F
Tower Sump Temperature	<value> F

Set Controller Address — The UC Open XP controller's rotary switches determine the UC open XP's MAC address when it is placed on a BACnet MS/TP network. The rotary switches define the MAC address portion of the device's BACnet address, which is composed of the network address and MAC address.

Perform the following procedure to assign an address:

1. Turn off the UPC Open XP power switch.
2. Using the rotary switches, set the controller address. Set the Tens (10's) switch to the tens digit of the address, and set the Ones (1's) switch to the ones digit. For example, if the controller address is 25, point the arrow on the 10's switch to 2 and the aroow on the 1's switch to 5. See Fig. 7.
3. Turn on the UPC Open XP power switch. The controller reads the address each time power is applied.

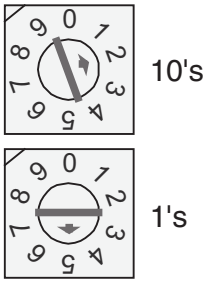


Fig. 7 — Address Rotary Switches

50XJ Variable Frequency Drive (VFD) Control and Start-Up — The VFD is factory-wired and programmed for proper operation with the unit controls. No installation or service adjustments are normally required. There is a keypad/display mounted on the front of the VFD which is independent of the main 50XJ control display.

For basic information on using the VFD keypad/display refer to the VFD Control and Display section.

VFD START-UP PROCEDURE — The following procedure is used to start up the VFD.

1. Switch the 50XJ PCB1 power switch to OFF.
2. Apply VFD unit power. From the VFD keypad, perform the following steps.
3. Press [EXIT] at the "Auto Choice - Is this an air-handler or rooftop?" prompt.
4. Press [MENU] until the "Main Menu" is displayed.
5. Use the UP/DOWN keys to select "ASSISTANTS" and press <ENTER>.
6. Use the UP/DOWN keys to select "Commission Drive" and press [SEL].
7. Verify the following parameters. If they are correct, press <SAVE> to move to the next parameter. Use the UP/DOWN keys to change parameters, then press <SAVE>. If you make a mistake in the data entry, press <EXIT> and re-start the procedure at Step 6.

   9905 Motor Nom Volt - should equal unit voltage (230V or 460V)

   9906 Motor Nom Current - equal to motor FLA (see motor nameplate).

   9907 Motor Nom Freq - always 60 Hz.

   9908 Motor Nom Speed - set to motor nameplate RPM.

   9909 Motor Nom Power - set to motor nameplate HP.

   9902 HVAC Default - press <EXIT>
8. Press <EXIT>, <EXIT>.
9. Press [MENU] until the "Main Menu" is displayed.
10. Use the UP/DOWN keys to select "PARAMETERS" and press <ENTER>.

11. Use the UP/DOWN keys to select "20 Limits" and press [SEL].
12. Use the UP/DOWN keys to select "2003 Max Current" and press [EDIT].
13. Set equal to the motor nameplate FLA * Service Factor; press [SAVE]. If not possible, set the drive to the motor FLA. If that is not possible, STOP immediately and call engineering support.
14. Press [EXIT] repeatedly until the drive returns to "PARAMETER" screen.
15. Use the UP/DOWN keys to select "26 Motor Control" and press [SEL].
16. Use the UP/DOWN keys to select "2606 Switching Freq" and press [EDIT].
17. Use the UP/DOWN keys to select "8 kHz" and press [SAVE].
18. Press [EXIT] repeatedly until the drive returns to "PARAMETER" screen.
19. Use the UP/DOWN keys to select "16 System Controls" and press [SEL].
20. Use the UP/DOWN keys to select "1601 - Run Enable" and press [EDIT].
21. Use the UP/DOWN keys to select "NOT SEL" and press [SAVE].
22. Use UP/DOWN keys to select "1608 - Start Enable 1" and press [EDIT].
23. Use UP/DOWN keys to select "NOT SEL" and press [SAVE].
24. Press [EXIT] repeatedly until the drive returns to the monitor screen and displays Hz, Amps, etc.
25. Switch 50XJ PCB1 power switch to ON.

VFD Control and Display — The VFD keypad/display is shown in Fig. 8.

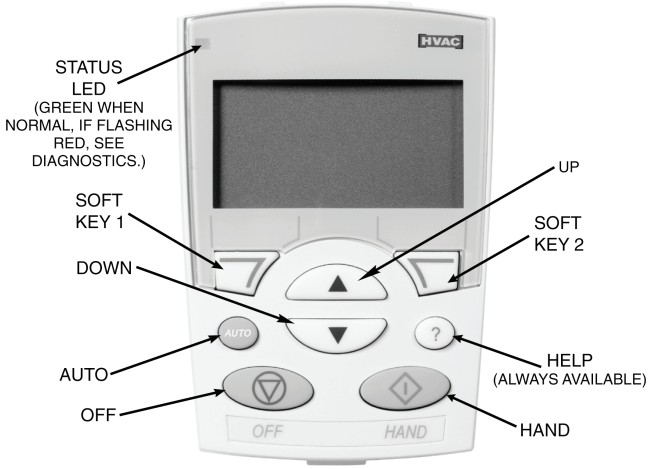


Fig. 8 — VFD Keypad/Display

OPERATING THE DRIVE — The first time the drive is powered up, it is in the AUTO mode (remote control), and controlled from the control terminal block X1. To switch to the HAND mode (local control) and control the drive using the control panel (operator keypad), press the HAND key or or the OFF key. Pressing the HAND key switches the drive to local control while keeping the drive running. Pressing the OFF key switches to local control and stops the drive. To switch back to the AUTO mode, press the AUTO key.

The function of SOFT KEYS 1 and 2 change depending on what is displayed on the screen. The function of SOFT KEY 1 matches the word in the lower left-hand box on the display screen. The function of SOFT KEY 2 matches the word in the lower right-hand box on the display screen. If the box is empty, then the SOFT KEY does not have a function on that specific screen. The UP and DOWN keys are used to navigate through the menus. The OFF key is used to turn off the VFD. The AUTO key is used to change control of the drive to automatic control. The HAND key is used to change control of the drive to local (hand held) control. The HELP button is used to access the help screens.

START-UP WITH ASSISTANT — To start up the VFD with the Start-Up Assistant, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight ASSISTANTS on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP or DOWN keys to highlight Commission Drive and press SEL (SOFT KEY 2).
4. The Start-Up Assistant will display the parameters that need to be configured. Select the desired values and press SAVE (SOFT KEY 2) after every change. The process will continue until all the parameters are set.

START-UP BY CHANGING PARAMETERS INDIVIDUALLY — To start up the VFD with by changing individual parameters, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight PARAMETERS on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP and DOWN keys to highlight the desired parameter group and press SEL (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight the desired parameter and press EDIT (SOFT KEY 2).
5. Use the UP or DOWN keys to change the value of the parameter.
6. Press SAVE (SOFT KEY 2) to store the modified value. Press CANCEL (SOFT KEY 1) to keep the previous value. Any modifications that are not saved will not be changed.
7. Choose another parameter or press EXIT (SOFT KEY 1) to return to the listing of parameter groups. Continue until all the parameters have been configured and then press EXIT (SOFT KEY 1) to return to the main menu.

NOTE: The current parameter value appears above the highlighted parameter. To view the default parameter value, press the UP and DOWN keys simultaneously. To restore the default factory settings, select the application macro "HVAC Default."

VFD Modes — The VFD has several different modes for configuring, operating, and diagnosing the VFD. The modes are:

- Standard Display mode — shows drive status information and operates the drive
- Parameters mode — edits parameter values individually
- Start-Up Assistant mode — guides the start up and configuration
- Changed Parameters mode — shows all changed parameters
- Drive Parameter Backup mode — stores or uploads the parameters
- clock set mode — sets the time and date for the drive
- I/O Settings mode — checks and edits the I/O settings

Standard Display Mode — Use the Standard Display mode to read information on the drive status and operate the drive. To reach the standard display mode, press EXIT until the LCD display shows status information as described below. See Fig. 9.

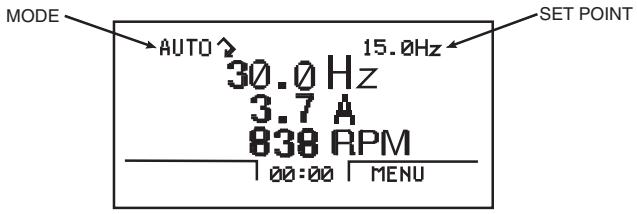


Fig. 9 — Standard Display Example

The top line of the LCD display shows the basic status information of the drive. The HAND icon indicates that the drive control is local from the control panel. The AUTO icon indicates that the drive control is in remote control mode through the I/O.

The arrow icon indicates the drive and motor rotation status. A rotating arrow (clockwise or counterclockwise) indicates that the drive is running. A rotating blinking arrow indicates that the drive is running but not at set point. A stationary arrow indicates that the drive is stopped. For Carrier air handler units, the rotation is always forward.

Using parameter group 34, the middle of the LCD display can be configured to display 3 parameter values. The default display shows parameters 0103 (OUTPUT FREQ) in Hz, 0104 (CURRENT) in amperes, and AI1 (Analog Input 1) in revolutions per minute.

The upper right hand corner shows the frequency set point that the drive will maintain. The bottom corners of the LCD display show the functions currently assigned to the two soft keys. The lower middle displays the current time (if configured to show the time).

The first time the drive is powered up, it is in the OFF mode. To switch to local hand-held control and control the drive using the control panel, press the HAND or AUTO buttons. Pressing the HAND button switches the drive to hand control while keeping the drive running. Pressing the AUTO button switches the drive to remote input control. The OFF button stops the drive. To return to auto control, press the AUTO button. To start the drive press the HAND or AUTO button, to stop the drive press the OFF button.

To adjust the speed set point while in HAND mode, press the UP or DOWN buttons (the reference changes immediately). The reference can be modified in the local control (HAND) mode, and can be parameterized (using Group 11 reference select) to also allow modification in the remote control mode.

Parameters Mode — The Parameters mode is used to change the parameters on the drive. To change parameters, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight PARAMETERS on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP or DOWN keys to highlight the desired parameter group and press SEL (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight the desired parameters and press EDIT (SOFT KEY 2).
5. Use the UP or DOWN keys to change the value of the parameters.
6. Press SAVE (SOFT KEY 2) to store the modified value. Press CANCEL (SOFT KEY 1) to keep the previous value. Any modifications that are not saved will not be changed.
7. Choose another parameter or press EXIT (SOFT KEY 1) to return to the listing of parameter groups. Continue until all parameters have been configured and then press EXIT (SOFT KEY 1) to return to main menu.

NOTE: The current parameter value appears above the highlight parameter. To view the default parameter value, press the UP and DOWN keys simultaneously. To restore the default factory settings if a drive fails, download the parameters to the VFD from the control panel. Parameters can also be changed individually.

Changed Parameters Mode — The Changed Parameters mode is used to view and edit recently changed parameters on the drive. To view the changed parameters, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight CHANGED PAR on the display screen and press ENTER (SOFT KEY 2). A list of the recently changed parameters will be displayed.
3. Use the UP or DOWN keys to highlight the desired parameter group and press EDIT (SOFT KEY 2) to change the parameters if desired.
4. Press EXIT (SOFT KEY1) to exit the Changed Parameters mode.

Drive Parameter Backup Mode — The Drive Parameter Backup mode is used to store the drive parameters. The parameters can be uploaded from a VFD to the removable control panel. If a drive failure occurs, the control panel can then be transferred to the new drive and the parameters downloaded into memory.

Each drive is custom programmed at the factory. The first option is to download all parameters. This copies both application and motor parameters to the drive from the control panel. This is recommended to create a backup of the parameters group for the drive.

The second option downloads only the application parameters to the drive. Parameters 9905, 9906, 9907, 9908, 9909, 1605, 1607, 5201, and group 51 parameters and internal motor parameters are not copied.

Upload All Parameters — To upload and store all parameters to the control panel from the VFD, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight PAR BACKUP on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP or DOWN keys to highlight UPLOAD TO PANEL and press SEL (SOFT KEY 2).
4. The text “Copying Parameters” will be displayed with a progress indicator. To stop the process, select ABORT (SOFT KEY 1).
5. When the upload is complete, the text “Parameter upload successful” will be displayed.
6. The display will then return to the PAR BACKUP menu. Select EXIT (SOFT KEY 1) to return to the main menu.
7. The control panel can now be disconnected from the drive.

Download All Parameters — To download all parameters from the control panel to the VFD, perform the following procedure:

1. Install the control panel with the correct parameters onto the replacement VFD.
2. Select MENU (SOFT KEY 2). The Main menu will be displayed.
3. Use the UP or DOWN keys to highlight PAR BACKUP on the display screen and press ENTER (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight DOWNLOAD TO DRIVE ALL and press SEL (SOFT KEY 2).

5. The text "Restoring Parameters" will be displayed with a progress indicator. To stop the process, select ABORT (SOFT KEY 1).
6. When the download is complete, the text "Parameter download successful" will be displayed.
7. The display will then return to the PAR BACKUP menu. Select EXIT (SOFT KEY 1) to return to the main menu.
8. The control panel can now be disconnected from the drive.

Clock Set Mode — The Clock Set mode is used for setting the date and time for the internal clock of the VFD. In order to use the timer functions of the VFD control, the internal clock must be set. The date is used to determine weekdays and is visible in the fault logs.

To set the clock, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight CLOCK SET on the display screen and press ENTER (SOFT KEY 2). The clock set parameter list will be displayed.
3. Use the UP or DOWN keys to highlight CLOCK VISIBILITY and press SEL (SOFT KEY 2). This parameter is used to display or hide the clock on the screen. Use the UP or DOWN keys to change parameter setting. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
4. Use the UP or DOWN keys to highlight SET TIME and press SEL (SOFT KEY 2). Use the UP or DOWN keys to change the hours and minutes. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
5. Use the UP or DOWN keys to highlight TIME FORMAT and press SEL (SOFT KEY 2). Use the UP and DOWN keys to change the parameter setting. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
6. Use the UP or DOWN keys to highlight SET DATE and press SEL (SOFT KEY 2). Use the UP or DOWN keys to change the day, month, and year. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
7. Use the UP or DOWN keys to highlight DATE FORMAT and press SEL (SOFT KEY 2). Use the UP or DOWN keys to change the parameter setting. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
8. Press EXIT (SOFT KEY 1) twice to return to the main menu.

I/O Settings Mode — The I/O Settings mode is used for viewing and editing the I/O settings.

To configure the I/O settings, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight I/O SETTINGS on the display screen and press ENTER (SOFT KEY 2). The I/O Settings parameter list will be displayed.
3. Use the UP or DOWN keys to highlight the desired I/O setting and press SEL (SOFT KEY 2).
4. Use the UP or DOWN keys to select the parameter to view. Press OK (SOFT KEY 2).
5. Use the UP or DOWN keys to change the parameter setting. Press SAVE (SOFT KEY 2) to save the configuration. Press CANCEL (SOFT KEY 1) to keep the previous value. Any modifications that are not saved will not be changed.
6. Press EXIT (SOFT KEY 1) twice to return to the main menu.

START-UP

General — Complete the start up checklist on page CL-1 before attempting system start-up.

Confirm that compressor suction and discharge service valves are OPEN. *Wait 24 hours before starting the compressors to permit warming by the crankcase heaters.*

AFTER 24 hours, continue with the procedures below.

Confirm the Input Power Phase Sequence — The input power phase rotation sequence must be L1-L2-L3 = ABC (or forward or clockwise) as indicated with a phase rotation meter. Incorrect input phase rotation will cause the compressors to rotate in reverse, which results in no cooling capacity.

IMPORTANT: Fan rotation direction can NOT be used for the phase sequence check; fan rotation for VAV units with a variable speed drive is independent of the unit input wiring sequence.

If the compressor is rotating the wrong direction, it may: emit increased noise; shut down due to internal overload protection; have only a small decrease in suction pressure when it starts; or have only a small increase in discharge pressure when it starts. Also, no cooling will be produced at the evaporator. If any of these conditions occur, refer to the Installation and Service Instructions to correct the compressor rotation before continuing.

PHASE/VOLTAGE MONITOR (OPTION)

1. Measure the input voltage at the main power terminal block (TB1).
2. If the measured voltage does not match the indicated voltage on the voltage monitor adjustment knob, disconnect unit power. Rotate the voltage adjustment knob on the face of the monitor to match the measured voltage. Reconnect unit power.

Water Fill and Air Purge — If present, water and steam valves should be opened to fill the unit piping and heat exchangers. Controlled valves may require a manual override of control actuators or manual override of the control signal outputs from the unit control panel or building management system. Refer to the 50XJ Installation and Service Instructions.

To remove air from the internal piping and heat exchangers, use the plug ports provided. On the condensers, use the condenser air vent (bleed valve) in the left side of the fan compartment (Fig. 10). On the water economizer coil (if present), the plug is on top of the supply header and return header, at the same end as the water connections. On the hot water coil (if present), the plug is on the top of the return header at the opposite end as the water connections. On the steam coil (if present), the plug is on the top of the supply header at the same end as the steam connections.

NOTE: Failure to remove air trapped in the heat exchangers will result in reduced capacity and/or may initiate system protection devices.

⚠ CAUTION

Avoid subjecting the condensers to thermal shock, excessive pressures and temperatures. These conditions can impose stress on the condenser, resulting in premature failure of the heat exchanger as well as other system components. DO NOT add hot fluid to the unit when it is cold, or cold fluid when the unit is hot.

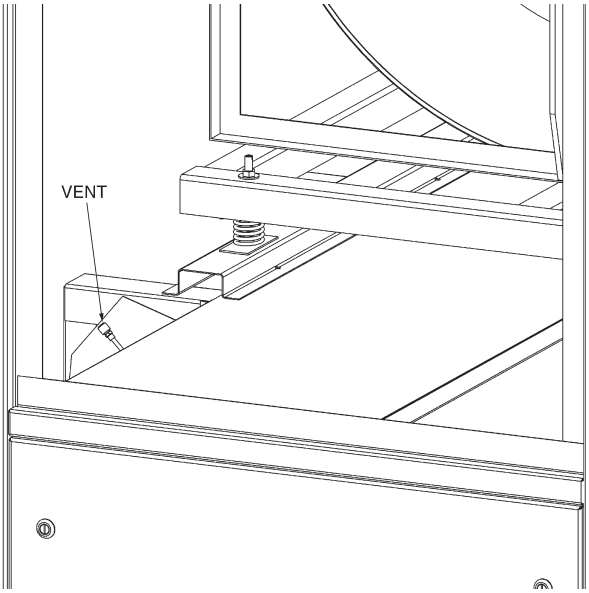


Fig. 10 — Condenser Air Vent

OPERATION

Occupancy Determination — The Omnizone™ controller allows several methods of occupancy determination, based upon the setting of the occupancy configuration. Local occupancy is determined by either a local schedule (Local Sched) contained in the controller, the use of the ROCC discrete input point (Remote DI) or by setting the unit configuration to always occupied (Always Occ).

When the Omnizone unit is connected to a network, occupancy can be controlled the occupancy configuration. To operate to a BACnet schedule, set the configuration to "BACnet Sched." To use a remote On/Off signal from a building automation system, set the configuration to "BAS On/Off."

Fan Control — All variable air volume (VAV) units have a variable frequency drive (VFD) to provide variable fan motor speed and thus variable airflow. Fan control turns the fan on and off based on unit operating mode, and controls fan speed to maintain a particular duct static pressure at a duct static pressure (DSP) sensor. The objective is to maintain a reasonably constant supply-air exit velocity at VAV system outlet grilles, regardless of damper opening positions. The duct static pressure sensor is field-installed about 2/3 of the way toward the "far end" of the ductwork. A duct high static (DHS) limit switch provides protection by shutting the fan down if the duct static pressure exceeds a maximum setting.

For the 50XJ unit, a VFD interface display is mounted in the front of the unit. A number of user-adjustable features can be entered/changed using the keypad on the display. These features are described in detail in the VFD Control and Display section.

Sequence of Operation — The following control sequence of operation for the 50XJ unit describes the various sequences that occur depending upon the way an operation is triggered and which software control points are involved.

SUPPLY FAN — The supply fan is enabled whenever the unit enters occupied mode. The fan is also enabled in the unoccupied mode with a cooling or heating demand. Fan operation will be prevented if there is an active duct high static pressure alarm, the optional phase rotation monitor indicates a problem, the duct static pressure sensor has failed or has an alarm, or there is a fire/smoke shutdown alarm.

When there are no alarms preventing fan operation and the fan is enabled, the (remote terminal control) TRMCT should turn on. Thirty seconds later the output to the VFD will increase. The VFD output level is determined by a PID calculation, based on the duct static pressure (DSP) input and the supply static pressure set point. Once the supply fan is running and the static pressure increases above the supply fan status set point the supply fan status point (SFS) will indicate ON.

The space temperature sensor point indicates the current value of the sensor used to determine cooling/heating demand. The sensor selection is based on the sensors installed and the configuration of these sensors in the custom configuration. The following sensors, when valid, are used for the space temperature sensor with the highest precedence at the top of the list:

- Space temperature sensor (SPT)
- Return air temperature sensor (MA_RA) - only used if the unit is NOT configured for reset by EWT.
- Entering water temperature (EWT) - only if the unit is configured for reset by EWT.
- Default with no sensors is the occupied cooling set point of 10 F (prevents unoccupied operation).

If the space has unoccupied demand, the supply fan is enabled. If conditions allow, the fan will start as described above. If the fan is running due to unoccupied heating or cooling demand, the controlling temperature input must rise or drop to within half way between the occupied and unoccupied set points in order for the fan to turn back off.

Once the unoccupied conditions are satisfied, there is a fixed 5-minute delay for normal fan shutdown. During the 5-minute delay, the cooling and heating routines become disabled. This delay allows a compressor that may have just started to run for its 5-minute minimum on-time with the supply fan on. For example, if the staging routine had just started compressor no. 3 at the time the call was satisfied, the cooling routine would become disabled and compressor no. 1 and 2 would shut off right away. Compressor no. 3 would continue to run for its minimum on time of 5 minutes. The fan continues running until all compressors meet the minimum on time and run with a load, preventing them from shutting down due to a safety.

Supply Fan operation with Optional Bypass — If the optional VFD bypass is installed and the bypass switch has been turned to bypass (line), and the VFD compartment access panel is in place, the software point VFD Access Panel Secure has been set to YES, there are no faults to prevent fan operation and there is a call for fan operation, then the bypass start stop point BPS_S will be engaged to start the fan. The terminal open point TRMOP will go on with the TRMCT point 30 seconds before the fan starts.

COMPRESSOR COOLING — If the fan is on and there is no demand for heat, internal software point (COOLOK) will switch to on. The unit MODE will not change to "Cooling" unit there is an active call for compressor operation.

If the unit is configured for variable flow the reverse/head pressure control valve will open (otherwise it will already be open), and if there is condenser water flow (or no flow switch installed), then mechanical cooling will be enabled.

Units are equipped with 2, 3, or 4 compressors piped in separate refrigerant circuits, and staged on/off in a fixed sequential manner (compressor no. 1 through compressor no. 4). The compressor control routine uses a PID calculation to determine the percentage of cooling required, from 1 to 100%. Demand for the PID calculation is determined from the supply air temperature and the supply air set point.

Compressor cooling will be disabled for any of the following reasons:

- There is no water flow (CDWF is off, with switch installed).
- Economizer freezestat (FREEZ) has been in alarm for more than 15 minutes.

- MODE changes to heat.
- OK-FAN turns off during normal shut down.

During normal compressor operation the minimum on time is 5 minutes and the minimum off time is 5 minutes.

ECONOMIZER COOLING — The unit diverts condenser inlet water flow through an optional economizer coil to precool evaporator entering airflow. This occurs when there is demand for the cooling, and the temperature at an entering water temperature (EWT) thermistor is colder than the economizer start set point. Water flow is controlled via two electronic water flow valves. This option also incorporates an economizer freeze sensor or switch (economizer temperature/freeze stat), located at the inlet of the economizer coil.

Economizer water flow is in series with the condensers allowing compressor operation while the economizer is operating.

The equipment mode will change to "Free Cooling" if there is no call for compressor operation, the fan is on, and there is no demand for heat. If the unit is configured for variable flow the reverse head pressure control valve will open (otherwise it will already be open), and if there is condenser water flow, then economizer cooling is enabled.

If the entering-water temperature is below the economizer set point then the Mod. Econ Enabled point (ECONOK) will change to enable and the economizer valve will modulate open to lower the economizer control temperature to the supply air set point temperature. The economizer modulation is controlled by a PID loop and the reverse/head pressure control valve will modulate in reverse of the economizer valve using the formula MVLV = 100 - ECONO.

COOLING RESET — The controller can reset the supply air set point using these two methods:

- An external 0 to 10 volt input reset
- The value of the space control point

The external 0 to 10 volt input reset is configured to produce a 0 to 20 degree supply air reset over the 2 to 10 volt range. If more than 1.8 volts is sensed on the input, this method of reset takes priority over other methods.

NOTE: The reset from all methods may be limited from 0 to 20 F by the Maximum Reset set point.

The return-air sensor, space temperature sensor, or entering water temperature input will be used as the space control point. If this control input goes below the Occupied Cooling set point, then for each degree that the point is below the set point value the supply air set point will be reset by the value configured in the reset ratio set point.

HEATING — The controller is configured to control either a hot water/steam valve or electric heat through a modulating 0 to 10 vdc output. A field-supplied and installed step sequencer can convert the modulating signal into two, four, or more discrete stages of control for non-SCR electric heat control.

For either method of heat to function, a space control point must be configured in the custom configuration. This control point comes from a return-air sensor or space sensor, or the entering water temperature sensor.

Whenever the space control point is below the occupied or unoccupied heat set point the mode will change to heat and if unoccupied the fan will be started. The heat control routine uses a PID to control the heating output to maintain the supply air set point.

When unoccupied heat is enabled the fan will be stopped and the heat turned off when the space control temperature is more than halfway above the difference between the occupied heat set point and the unoccupied heat set point. For example, if the occupied heat set point is 70 and the unoccupied heat set point is 60 the unit will come on for unoccupied heating below 60 F and turn off again above 65 F.

HEAD PRESSURE CONTROL (HPC) — In installations where entering water temperature can fall below 55 F, where a water economizer (described above) is not installed, the HPC provides an electronic water flow control valves to vary flow to the condensers. Controlling the water flow maintains compressor discharge pressure above a minimum value, ensuring sufficient refrigerant flow out of the condenser and throughout the refrigerant circuit. Refrigerant pressure is measured at compressor circuit no. 1 by a discharge pressure sensor (PRES).

The 50XJ units not equipped with a water economizer can be ordered with the reverse/head pressure control valve factory installed and a pressure transducer located in the discharge line of compressor no. 1.

When the unit is operating, cooling is enabled, a compressor is engaged, and the entering water temperature falls below 60 F, head pressure control will be enabled. The head pressure control valve will modulate to keep the head pressure at the Refrigerant Head Pressure set point. The default set point is 225 psig and may be set from 200 to 300 psig. The minimum output value for the head pressure control algorithm is 40% in order to maintain a minimum flow through the condensers. The valve will modulate between 40 and 100%.

VENTILATION REQUEST — The ventilation request output will close a set of relay contacts to activate a ventilation damper whenever the supply fan and supply fan status are both true and the unit status is occupied or override.

VAV TERMINAL OPERATION OUTPUT — The VAV terminal control output (TRMCT) closes a set of relay contacts to indicate to non-Carrier air terminals that the fan is on and operation has been verified. This signals the terminals to open and start controlling to the desired cfm and temperature set points.

VAV TERMINAL OPEN OUTPUT — The VAV terminal open output (TRMOP) closes a set of relay contacts to command the air terminals to open to maximum cfm at times when the fan is operating on the VFD bypass. This contact will close 30 seconds before the supply starts in bypass mode.

PUMP OUTPUT — The pump output closes a set of relay contacts to indicate that the 50XJ unit is in operation and may require condenser water flow through the unit. This contact is closed when the unit is not in heating mode and the supply fan is operating. This contact is also close if the economizer freeze controls (described above) detects unacceptable conditions with the unit configured without an air economizer or head pressure control.

TOWER OUTPUT — The tower output closes a set of relay contacts to start/stop tower controls. This contact closes when the unit is not in heating mode and the supply fan is operating.

BUILDING PRESSURE CONTROL — The building pressure control output provides an analog 0 to 10 vdc signal to control return fan or exhaust fan speed. Fan speed is modulated to maintain the building static pressure set point.

The control parameters for the building pressure set point and building pressure are read and controlled in voltage but are converted to inches of water for ease of setting and display. The range and low start values of the sensor selected should be configured in the setpoint screen, after the use of space static pressure sensor has been enabled on the configuration screen.

Diagnostic Features — The controller and BACview display provide a number of features to help protect the unit and allow problem diagnosis.

CRITICAL FAULT — The controller provides an output (for field connection) to signal an external building systems monitor or control that the unit has a critical alarm that may be impacting unit operation. The alarm lamp on the BACview display provides visual indication of this condition.

The BACview display allows the user to monitor alarms and determine sensor input values.

FIRE INPUT (FSD) — This is a normally closed input connected to the controller. When this input is opened, all control outputs are immediately turned off, including the fan.

DUCT HIGH STATIC INPUT (DHS) — This differential air pressure switch provides backup protection for the ductwork. It is factory installed in the unit and wired to the unit controller. This switch has a manually adjustable set point with a range of 1 to 5 in. wg. Upon switch closure, the controller immediately turns all outputs off, including fan, and then indicates an alarm both by turning on its alarm output, the BACview alarm lamp and via communications (if used).

DIRTY FILTERS SWITCH (FLTS) — This is a factory-installed option on the 50XJ unit. This input is used to connect a pressure switch that measures the air pressure difference across the filters. When the delta increases beyond the preset setting, a dirty filter alarm is activated, indicating that the filters need cleaning or replacement.

The switch is normally open, with manually adjustable setting at the switch between 0.5 and 1.5 in. wg. Upon closure, controller holds the alarm for 1 minute to assure that the condition is stable and then it activates the alarm. Beyond the alarm, the dirty filter condition does not affect controller operation, so the unit should operate normally.

COMPRESSOR OVERLOAD (COL)/SAFETIES — Each compressor is provided with either an internal line-break overcurrent protector or an external overload protection module. Each compressor control circuit also contains a compressor lockout board (CLO), high-pressure switch (HPS), low-pressure switch (LPS), and evaporator freeze switch (FRZ). Except for the internal line-break protection, these devices are wired in series to the contactor for each compressor. A pilot relay is wired in parallel with the compressor contactor to determine when the compressor contactor is energized/de-energized.

The compressor lockout board (CLO) is located in the unit control box, wired in the control line for the compressor contactor, and incorporates a current loop which monitors one leg of the compressor power leads. This board is powered along with the related compressor contactor.

Whenever the compressor current falls below a threshold level (i.e., compressor not operating) on an energized circuit, the lockout board activates an on-board relay which opens power to the compressor contactor and pilot relay. The pilot relay contacts signal the controller with the compressor status. If any of the safety devices described above opens, the compressor shutdown sequence is started. In the event this occurs, the controller should turn off this compressor, and start the next compressor in sequence. After a 5-minute period, the controller should restart this compressor, and turn the other one off, as cooling demand requires. If the "problem" compressor then operates for 10 minutes of run time normally, the unit reverts to normal operation and compressor sequencing. If not, and the same error occurs again, this compressor should be shut down and replaced with the next compressor, as before, and held off for 10 minutes. It should then be restarted and the other compressor shut down, as before. If it does not run successfully for 10 minutes of normal run time again, it is shut down and replaced a third time. This time it is held off for 15 minutes. If the "problem" compressor does not operate successfully for the 10 minutes of normal run time this third time, this compressor ONLY is shut down and locked out for servicing. A compressor lockout alarm is generated and the BACview alarm lamp is turned on.

HIGH-PRESSURE SWITCH (HPS) — This switch is located in the discharge refrigerant line of each compressor, and is set to open at pressures above 570 psig. It is wired in the 24-vac control power line of the compressor contactor (in series with the LPS and FRZ) and disables compressor operation when it opens.

LOW-PRESSURE SWITCH (LPS) — The low-pressure switch (LPS) is located in the suction refrigerant line of each compressor, and is set to open at pressures below 27 psig. The LPS is wired in the 24-vac control power line of the compressor contactor (in series with the HPS and FRZ) and disables compressor operation when it opens.

EVAPORATOR FREEZE SWITCH (FRZ) — The evaporator freeze switch (FRZ) is a thermal disk type switch, mounted on a return bend of the evaporator, refrigerant circuit for which corresponds to each respective compressor, and is set to open at temperatures below 28 F. The FRZ is wired in the 24-vac control power line of the compressor contactor (in series with the LPS and HPS) and disables compressor operation when it opens.

COMPRESSOR EXTERNAL OVERLOAD PROTECTION MODULE — This board is provided with each compressor that does not include internal line-break overload protection. When installed, this board is in the compressor terminal box. This board activates at an over temperature setting, and locks out operation of the compressor for 30 minutes; there is no method to override or reset this timer. Due to this timing function, please note that the compressor will not attempt to restart until the third attempt described above.

COMPRESSOR INTERNAL LINE-BREAK OVERLOAD PROTECTION MODULE — Some compressors are built with internal line-break protection. When the winding temperature exceeds the protector setting, the protector opens two of the three power lines within the compressor. This protector keeps the compressor locked out until the winding temperature falls below the protectors reset temperature. There is no method to override or reset this protector, except by lowering the winding temperature. Under some circumstances, the compressor may not attempt to restart until the third attempt described above.

ALARMS — There are four methods to annunciate alarms: BACview alarm lamp, BACview alarm display, network communications, or the discreet alarm output dry contacts. Alarms are covered in detail in the Troubleshooting section.

TROUBLESHOOTING

Standard Diagnostic Features, Alarms and Alarm Lamps — Unit reset of alarm failure operation is automatic when fault is cleared, except as noted.

SUPPLY AIR TEMPERATURE ALARM — If supply air temperature input falls outside the range of 25 to 150 F, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "sat_alarm" will be generated, but the unit will operate normally.

SUPPLY AIR TEMPERATURE SENSOR FAILURE — If the supply air temperature sensor fails the system will display a supply-air temperature of 0.00° F, the compressor outputs will be disabled, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "sat_sen_alarm" will be generated.

DUCT STATIC PRESSURE ALARM — If the duct static pressure input falls outside the range of 0.06 to 5.45 in. wg, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "dsp_alarm" will be generated, but the unit will operate normally.

DUCT STATIC PRESSURE SENSOR FAILURE — If the duct static pressure sensor fails, the system will display 0.00 in. wg, the controller outputs will be forced off, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "dsp_sens_alarm" will be generated.

DUCT HIGH STATIC INPUT (DHS) — This factory-installed air switch provides over pressurization protection for the ductwork. The switch is a normally open switch, with adjustable manual setting (range is 1 to 5 in. wg with a default of 3.0 in. wg). Upon switch closure, the controller outputs will be forced off, the alarm output will close and the red alarm lamp

will be lit. An alarm with an ID of "dhs_alarm" will be generated.

FIRE/SHUTDOWN INPUT (FSD) — This is a normally closed input, which when opened, all control outputs are immediately turned off, including the fan, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "fire_alarm" will be generated.

CONDENSER WATER FLOW (CDWF) — This is an optional switch that can be used with the Omnizone™ controller. A thermal dispersion flow switch detects water flowing past the sensor element and closes normally open contacts that energize a relay with normally open contacts to the unit controller. A configuration set point is used to indicate if this switch is installed and disable alarms from the flow switch. When the flow switch is installed, the controller will check for water flow when flow is requested for unit operation and if flow is not detected, compressor operation will be disabled. The controller will also test or to see if there is water flow when the unit is not operating. If there is no flow when the unit is operating or if there is flow when the unit is not operating, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "cdwf_alrm" will be generated.

DIRTY FILTERS SWITCH INPUT (DFS) — This optional air pressure switch may be factory-installed in the 50XJ unit to detect the pressure differential pressure across the return air filters. This switch is normally open, with manually adjustable setting at the switch between 0.5 and 1.5 in. wg. Upon closure, controller should wait to assure closure for minimum 1 minute, and then the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "flts_alarm" will be generated. However, all other unit operation should remain normal.

PHASE LOSS/REVERSAL INPUT (PRM) — A power monitor may be installed in the unit to detect over-voltage, under-voltage conditions, phase loss and/or phase reversal. Upon switch closure a pilot relay is engaged and the input to the controller is closed. In adverse power conditions, all controller outputs will be forced off, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "prm_alarm" will be generated.

ECONOMIZER COIL FREEZE PROTECTION — This input can be either a dry contact input or an averaging thermistor sensor. This protection is installed in the 50XJ unit when the economizer coil is provided. In the event the freeze protection switch contacts open or the sensed economizer temperature falls below 37 F, or the sensed economizer temperature sensor fails, the ventilation request output will be closed, the pump output will be closed, the compressor outputs will be opened, the alarm output will close, the water economizer valve will open to 100%, and the red alarm lamp will be lit. This will maintain condenser water flow through the coil to prevent freezing the coil while stopping all other operations that could have contributed or will be affected by the freeze condition. An alarm with an ID of "eco_freeze" will be generated.

If the freeze condition is maintained for 15 minutes, the supply fan will be stopped. The optional factory-installed switch is a manually reset device. The optional factory-installed thermistor will automatically reset when the return-air temperature exceeds 42 F.

COMPRESSOR STATUS — Compressor status is determined from the compressor relay (CRx) inputs to the controller. If a compressor input is off for several seconds while that compressor is commanded on, the compressor output will be shut down. After five minutes, the controller will attempt to restart the compressor, provided there is a call for cooling. If the compressor fails again, the controller will shut down the compressor and attempt to restart it 10 minutes later. If the compressor fails again, the controller will shut down the compressor and attempt to restart it 15 minutes later, assuming there is still a call for cooling. On a third failed attempt to run the compressor, the compressor will be locked out pending a power reset or the end of the cooling cycle (no cooling demand).

When a compressor is locked out or the controller detects compressor operation with no call for that compressor, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "dx#_alarm" will be generated, where "#" designates which compressor (numbers 1 through 4) is locked out. This alarm is only maintained while the controller is calling for a compressor and compressor operation is not detected or while compressor operation is detected and the controller is not calling for operation.

An alarm with ID of "dx#_lockout" is generated when it becomes locked out after three run attempts.

SUPPLY FAN STATUS — Supply fan status is determined by duct static pressure sensor. If the fan is operating and a fan speed signal is sent to the VFD, the duct static pressure must become greater than the supply fan proof level (minsps_sp) for the supply fan status software point to turn on. When the duct static pressure becomes lower than the supply fan status low set point, the supply fan status will indicate OFF.

SUPPLY FAN FAILURE (OFF) — If the supply fan status is off for 4 minutes while the fan output is on, the alarm output will close and the red alarm lamp will light. An alarm with an ID of "sf_fail" is generated. This alarm does not directly affect unit operation; however, the cooling, heating and other outputs require the fan status to be on before they can be engaged.

SUPPLY FAN FAILURE (ON) — If the supply fan status is on for 4 minutes while the fan output is off, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "sfs_alarm" will be generated. This error does not affect unit operation.

REFRIGERANT PRESSURE TRANSDUCER (PRES) — If the optional head pressure control option is enabled and the pressure transducer input exceeds 420 psig or falls below -6.7 psig, head pressure control will be disabled, the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "ref_pres_alarm" will be generated.

INDOOR AIR QUALITY SENSOR ALARM (IAQ) — If an indoor air quality sensor is field-installed and configured, the controller will consider the IAQ input invalid if the level falls below 0 ppm or exceeds 2000 ppm, then the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "iaq_sns_alarm" will be generated and the control point will show 0 ppm. This error disables demand ventilation, but has no other effect on unit operation.

INDOOR RELATIVE HUMIDITY SENSOR ALARM (IRH) — If an indoor relative humidity sensor is field-installed and configured, the controller will consider the IRH input invalid if the level falls below 0 or exceeds 100 %, then the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "irh_sns_alarm" will be generated and the control point will show 0% rh. This error disables humidity control, but has no other effect on unit operation.

SPACE STATIC PRESSURE ALARM (BLDG PRESSURE) — If a building pressure sensor is field-installed and configured, the controller will consider the pressure input invalid if the level falls below the configured low range set point or exceeds the low range set point plus the sensor range. In this case the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "spstatic" will be generated and the control point will show 0 in. wg. This error disables space (building) static pressure control, but has no other effect on unit operation.

SPACE TEMPERATURE SENSOR FAILURE (SPT) — If a space temperature sensor (SPT) is field-installed and configured, the controller will consider the SPT input invalid if the input temperature falls below 2 F or exceeds 180 F for a continuous 10 seconds, then the alarm output will close and the red alarm lamp will be lit. An alarm with an ID of "spt_alarm" will

be generated. This error disables tenant (unoccupied) override by the SPT sensor and prevents use of this sensor value in the cooling/heating mode determination and the supply air reset calculation.

ENTERING WATER TEMPERATURE ALARM (EWT) — If an entering water temperature sensor is installed or the unit is configured for supply air temperature reset by the entering water temperature input, an alarm with an ID of "ewt_alarm" will be generated if the temperature input exceeds 115 F or falls below 35 F. The alarm output will close and the red alarm lamp will be lit; however, this alarm does not affect unit operation.

ENTERING WATER TEMPERATURE SENSOR FAILURE (EWT) — If an entering water temperature sensor is installed or the unit is configured for supply air temperature reset by the entering water temperature input, an alarm with an ID of "ewt_sen_alarm" will be generated if the temperature input exceeds 200 F or falls below -45 F. The alarm output will close and the red alarm lamp will light. The EWT output will show 0° F and this sensor should not be used in the cooling/heating mode determination or the supply air reset calculation (if enabled). This alarm will also disable water economizer operation and head pressure control.

MIXED OR RETURN AIR TEMPERATURE ALARM (MA_RA) — If a mixed or return air temperature sensor is installed, an alarm with an ID of "mara_alarm" will be generated if the temperature input exceeds 120 F or falls below 35 F. The alarm output will close and the red alarm lamp will light; however, this alarm does not affect unit operation.

MIXED OR RETURN AIR TEMPERATURE SENSOR FAILURE (MA_RA) — If a mixed or return air temperature sensor is installed, an alarm with an ID of "mara_sen_alarm" will be generated if the temperature input exceeds 200 F or falls below -45 F. The alarm output will close, the red alarm lamp will light, and the unit will output a value of 0° F for this point. This invalid input is not used the supply air reset calculation, cooling/heating mode determination, or for control of an air economizer.

OUTDOOR AIR TEMPERATURE ALARM (OAT) — If an outdoor air temperature sensor is installed and configured, an alarm with an ID of "oat_alarm" will be generated if the temperature input exceeds 120 F or falls below 35 F. The alarm output will close and the red alarm lamp will light; however, this alarm does not affect unit operation.

OUTDOOR AIR TEMPERATURE SENSOR FAILURE (OAT) — If an outdoor air temperature sensor is installed and configured, an alarm with an ID of "oat_alarm" will be generated if the temperature input exceeds 200 F or falls below -45 F. The alarm output will close and the red alarm lamp will light. The outside air temperature output will show 0° F and the program will use a value of (Economizer Setpoint + 2 F) for the outside-air temperature in the optional airside economizer routine.

COMPRESSOR RUNTIME ALARM — There is a set point to define a maximum compressor runtime in hours for each compressor. If a non-zero value is entered, the unit will generate an alarm with an ID of "dx#_rntm" when the compressor runtime exceeds the set point. "#" designates the compressor number. This alarm will cause the red alarm lamp to be lit, but since it is only a status alarm, unit operation is not affected and this does not close the alarm output.

SUPPLY FAN RUNTIME ALARM — There is a set point to define a maximum supply fan run time. If a non-zero value is entered, the unit will generate an alarm with an ID of "sf_rntm" when the runtime exceeds the set point. This alarm will cause the red alarm lamp to be lit, but since it is only a status alarm, unit operation is not affected and this does not close the alarm output.

SELF-TEST ALARM — When the user starts a self-test sequence, an alarm with an ID of "selftest_alarm" will be generated and the red alarm lamp will light. This alarm is maintained for 4 minutes after the last self-test sequence has run. This alarm stops normal unit operation, but the unit returns to normal operation when the alarm is cleared. The alarm output is closed to designate each step of multi-step self-test routines (see the Automatic Self-Test section for details).

50XJ Wiring Diagrams — The typical wiring diagrams for the 50XJ units are shown in Fig. 11 and 12.

LEGEND AND NOTES FOR FIG. 11 AND 12

LEGEND

BPS_S	—	Fan Start/Stop Relay (VFD Bypass Mode)
C	—	Compressor Contactor
CB	—	Circuit Breaker
CDWF	—	Condenser Waterflow Relay
CDWFS	—	Condenser Waterflow Switch
CH	—	Crankcase Heater
CLO	—	Compressor Lockout Control
COMP	—	Compressor
CR	—	Compressor Relay
DHS	—	Duct High Static Limit Switch
DISC1	—	Disconnect Switch
DSP	—	Duct Static Pressure Transducer
ECONO	—	Economizer Valve/Damper Control
EWT	—	Entering Water Temperature Sensor
FLTS	—	Filter Status Switch
FREEZ	—	Freeze Thermostat (Water Economizer)
FRZ	—	Freeze Thermostat (DX Circuit)
FU	—	Fuse
GND	—	Ground
HIR	—	Heat Interlock Relay
HPS	—	Refrigerant High Pressure Switch
HRN	—	Harness
IAQ	—	Indoor Air Quality
IFM	—	Indoor Fan Motor
LPS	—	Refrigerant Low Pressure Switch
MA_RA	—	Mixed/Return Air Temperature Sensor
MVLV	—	Modulating Valve (Econ)/ Head Pressure Control
OAT	—	Outside Air Temperature
OLR	—	Compressor Motor Protector
PCB1	—	Unit Control Board (I/O Flex 6126)
PCB2	—	I/O Expansion Board (I/O Flex 8160)
PHASE	—	Phase/Rotation Monitor
PRM	—	Phase/Rotation Monitor Relay
PRES	—	Refrigerant Pressure Sensor
RESET	—	External Reset
RH	—	Relative Humidity
SAT	—	Supply Air Temperature Sensor
SPT	—	Space/Zone Temperature Sensor
T	—	Transformer
TB1	—	Power Distribution Terminal Block
TB3-5	—	24 V Neutral Terminal Block
TB7	—	24 V Hot Terminal Block
TRMCT	—	VAV Terminals Control
TRMOP	—	VAV Terminals Open
VAV	—	Variable Air Volume
VENTR	—	Ventilation Output
VFD	—	Variable Frequency Drive
—··—		Optional Wiring (Optional items noted with *)
– – – –		Field Wiring

NOTES:

1. Partial wiring shown on both power and control diagrams.
2. All class 2 transformers are wired into separate circuits. Do not interconnect these transformers or circuits; circuit separation shall be maintained.
3. On 200/240-v units, the transformers are factory-wired for 240 v. for 200-v applications, move the blue wire to the 200-v tap of each transformer.
4. Shielded wire shall have drain wire connected to VFD ground screw. The floating end of the drain wire shall be insulated.
5. Shielded wire shall have drain wire connected to the control panel, adjacent to the PCB. The floating end of the drain wire shall be insulated.

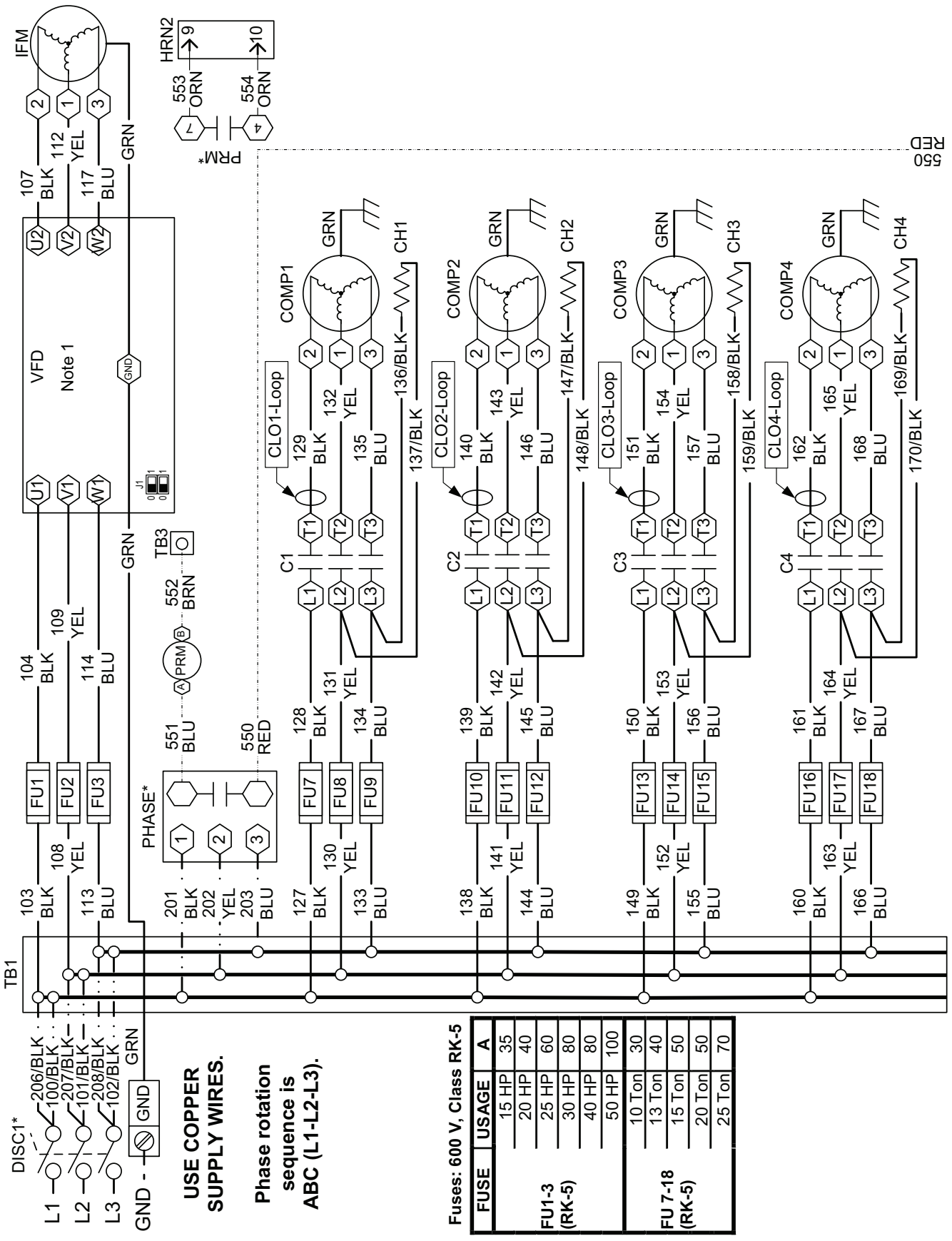


Fig. 11 — Typical Power Panel and Compressor Wiring Diagram

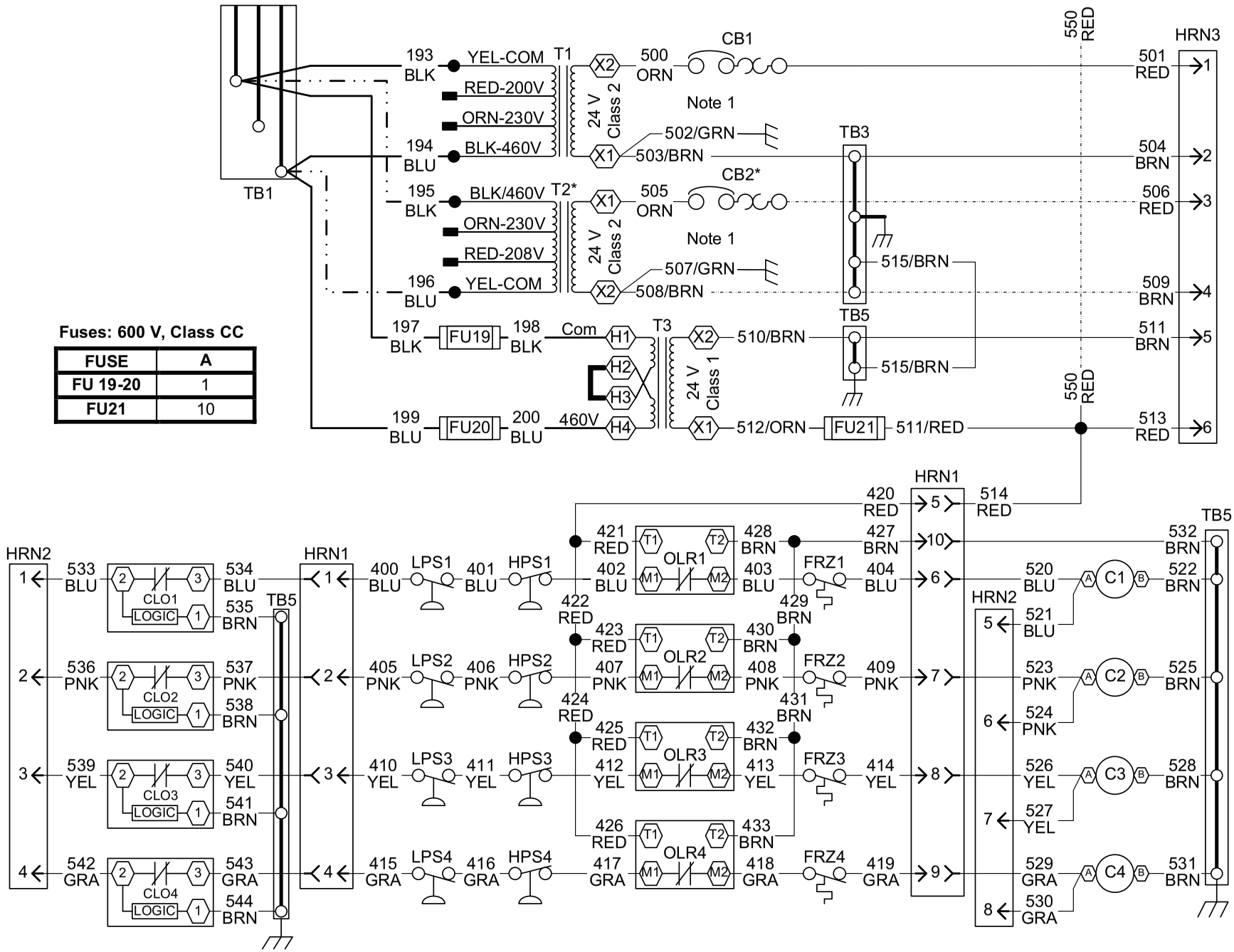


Fig. 11 — Typical Power Panel and Compressor Wiring Diagram (cont)

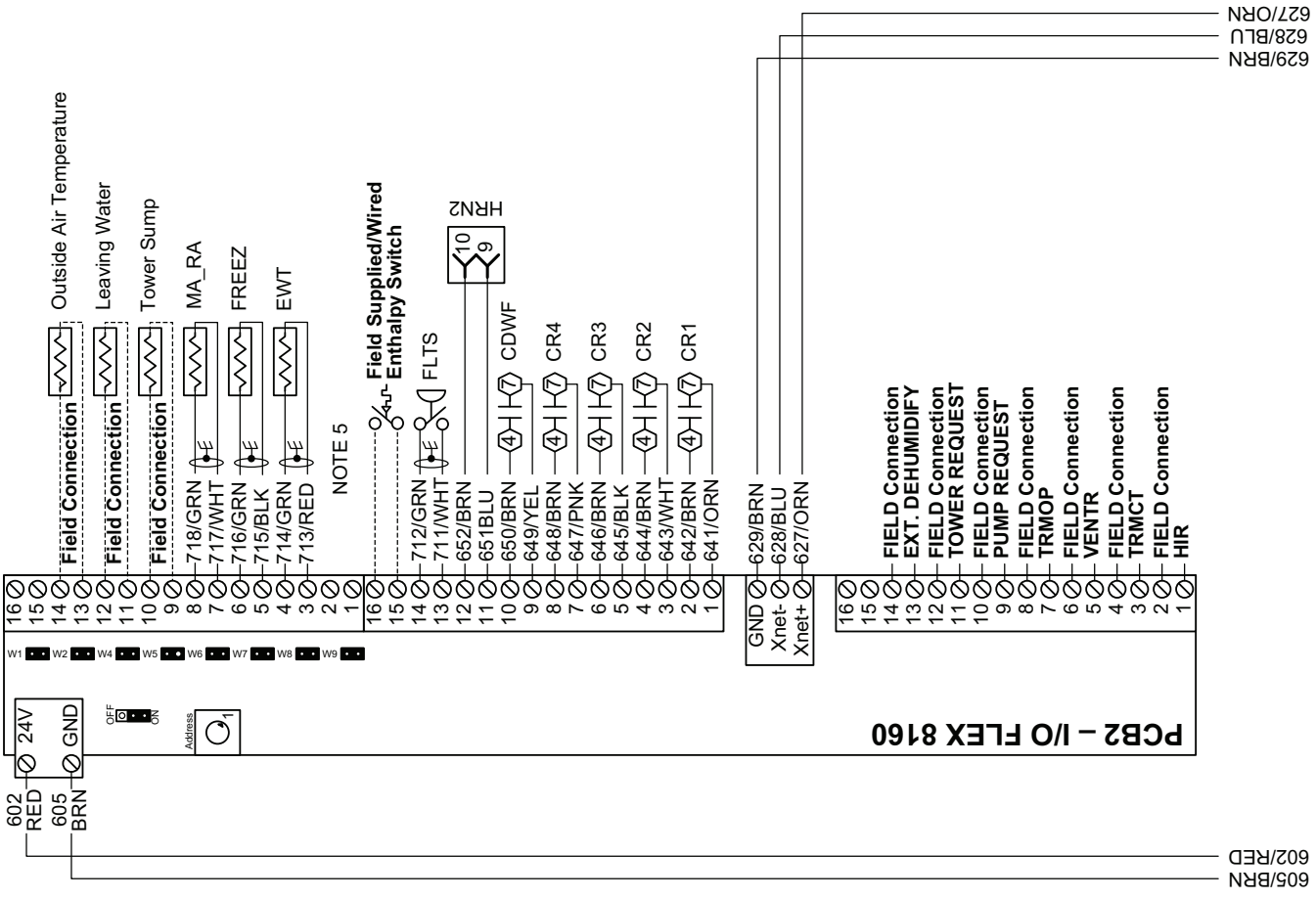


Fig. 12 — Typical Low Voltage Control Wiring Diagram

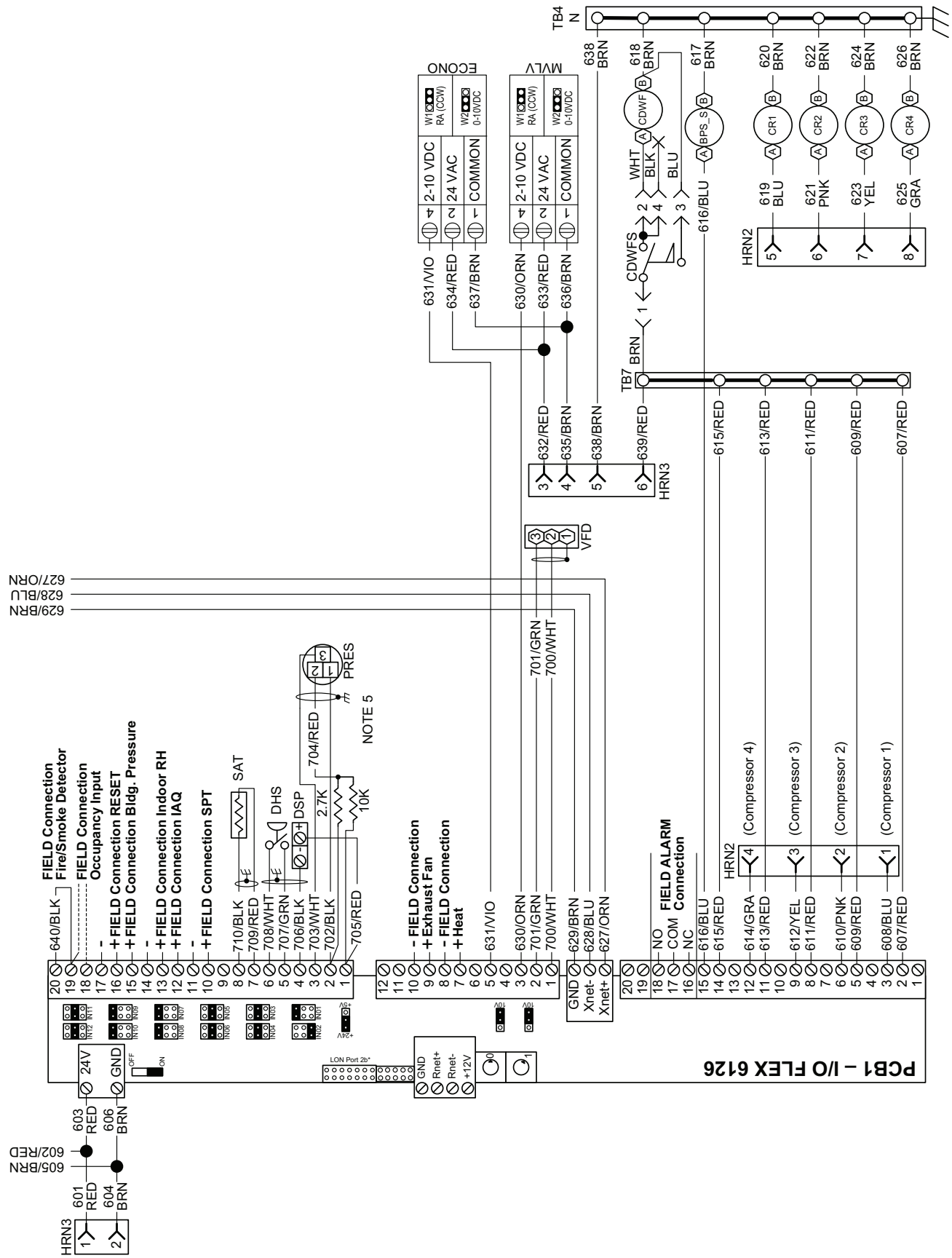


Fig. 12 — Typical Low Voltage Control Wiring Diagram (cont)

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Catalog No. 04-53500117-01 Printed in U.S.A. Form 50XJ-2T Pg 30 8-14 Replaces: 50XJ-1T

START-UP CHECKLIST

(Fill out this form on Start-Up and file in job folder)

I. PRELIMINARY INFORMATION:

50XJ UNIT: MODEL NO. _____ SERIAL NO. _____

FIELD-INSTALLED ACCESSORIES: _____

START-UP DATE: _____

II. PRE-START-UP:

VERIFY ALL SHIPPING MATERIALS HAVE BEEN REMOVED FROM THE UNIT

IS THERE ANY SHIPPING DAMAGE? _____ IF SO, WHERE _____

_____

WILL THIS DAMAGE PREVENT UNIT START-UP?(Y/N) _____

CHECK POWER SUPPLY. DOES IT AGREE WITH UNIT?(Y/N) _____

HAS THE GROUND WIRE BEEN CONNECTED?(Y/N) _____

HAS THE CIRCUIT PROTECTION BEEN SIZED AND INSTALLED PROPERLY?(Y/N) _____

ARE THE POWER WIRES TO THE UNIT SIZED AND INSTALLED PROPERLY?(Y/N) _____

HAS THE CORRECT INPUT POWER PHASE SEQUENCE BEEN CONFIRMED WITH A METER?(Y/N) _____

HAS THE FAN AND MOTOR PULLEY BEEN CHECKED FOR PROPER ALIGNMENT AND DOES THE FAN BELT HAVE PROPER TENSION?(Y/N) _____

HAS WATER BEEN PLACED IN DRAIN PAN TO CONFIRM PROPER DRAINAGE?(Y/N) _____

ARE PROPER AIR FILTERS IN PLACE AND CLEAN?(Y/N) _____

VERIFY THAT THE UNIT IS INSTALLED WITHIN LEVELING TOLERANCES

CONTROLS

HAS THE DUCT STATIC PRESSURE PROBE BEEN INSTALLED?(Y/N) _____

HAVE CONTROL CONNECTIONS BEEN MADE AND CHECKED?(Y/N) _____

ARE ALL WIRING TERMINALS (including main power supply) TIGHT?(Y/N) _____

HAS AUTOMATIC RUN TEST BEEN COMPLETED?(Y/N) _____

HAS THE VFD CHECKOUT BEEN COMPLETED?(Y/N) _____

PIPING

HAVE LEAK CHECKS BEEN MADE AT COMPRESSOR, CONDENSER, EVAPORATOR, TXVs (Thermostatic Expansion Valves), SOLENOID VALVES, FILTER DRIERS, AND FUSIBLE PLUGS WITH A LEAK DETECTOR? (Y/N) _____

HAVE WATER AND STEAM VALVES BEEN OPENED (TO FILL PIPING AND HEAT EXCHANGERS)?(Y/N) _____

HAS AIR PURGE BEEN PERFORMED? (Y/N) _____

ELECTRICAL

CHECK VOLTAGE IMBALANCE

LINE-TO-LINE VOLTS: AB _____ V AC _____ V BC _____ V

(AB + AC + BC)/3 = AVERAGE VOLTAGE = _____ V

MAXIMUM DEVIATION FROM AVERAGE VOLTAGE = _____ V

VOLTAGE IMBALANCE = 100 X (MAX DEVIATION)/(AVERAGE VOLTAGE) = _____ % (IF OVER 2% VOLTAGE IMBALANCE, DO NOT ATTEMPT TO START SYSTEM; CALL LOCAL POWER COMPANY FOR ASSISTANCE.)

III. START-UP:

CHECK FAN SPEED AND RECORD. _____

AFTER AT LEAST 15 MINUTES RUNNING TIME, RECORD THE FOLLOWING MEASUREMENTS:

	CIRCUIT 1	CIRCUIT 2	CIRCUIT 3	CIRCUIT 4
SUCTION PRESSURE				
SATURATED SUCTION TEMP				
SUCTION LINE TEMP				
SUPERHEAT DEGREES				
DISCHARGE PRESSURE				
SATURATED CONDENSING				
LIQUID LINE TEMP				
SUBCOOLING DEGREES				
LIQUID SIGHT GLASS (CLEAR/BUBBLES)				
ENTERING CONDENSER-WATER TEMP				
LEAVING CONDENSER-WATER TEMP				
EVAP ENTERING-AIR DB (dry bulb) TEMP				
EVAP ENTERING-AIR WB (wet bulb) TEMP				
EVAP LEAVING-AIR DB TEMP				
EVAP LEAVING-AIR WB TEMP				

COMPRESSOR AMPS:

L1				
L2				
L3				

SUPPLY FAN AMPS:

L1	
L2	
L3	

NOTES: _____

_____

_____

_____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE