ACCESSORY INSTALLATION INSTRUCTIONS

MILLENNIUM HEAD PRESSURE CONTROL KIT FOR LOW AMBIENT APPLICATIONS

HEAD PRESSURE CONTROL FOR 208/230 & 460V 30 & 40 TON MILLENNIUM UNITS

DESCRIPTION

These units are only designed to operate at ambient temperatures down to 40°F. This accessory will insure safe operation at ambient temperatures down to 0°F.

The Head Pressure Control option controls the speed of condenser fan #1 for low ambient mechanical cooling operation of systems #1 and #2. System #3 on a 30 ton and system #3 and #4 on a 40 ton are locked out below 45°F ambient.

Table 1: CONTROL APPLICATION DATA

ACCESSORY MODEL NO.	VOLTAGE
2LA047034025 2LA047034046	208V & 230V 460V

Table 2: COMPONENTS SUPPLIED WITH KIT

QUANTITY	DESCRIPTION
1	Head pressure Control assembly. Consisting of:
1	Sheet metal back plate. (HPC assembly back plate)

1	2LA047034025 =208/230 Variable frequency drive, Magnetek 333, Model # DS022
	2LD047034046 =460V Variable frequency drive, Magnetek 333, Model # DS042

1	Electronic Proportional Plus Integral Control, Johnson model P352P
2	Refrigerant Pressure Transducer, Johnson model P99
2	Diode
1	2LA047034025 = 40VA transformer 230 volt primary and 24 volt secondary. 2LA047034046 = 40VA transformer 460 volt primary and 24 volt secondary.
1	Sheet metal cover.
1	0°F Cooling lockout switch (CLO2), Thermodisc model 37TV02-31115
2	Connector Tee
2	Neoprene air seal blocks
1	Wiring Diagram for Head Pressure Control Circuitry (035-16194-000)
1	Wire ties and #10 screws

The option includes two pressure transducers, a proportional integral sequence controller and a one horsepower variable frequency drive.

⚠ CAUTION

The pressure transducers are connected to the discharge line of system #1 and #2. Each pressure transducer is equipped with a switching diode on the white signal wire to eliminate feed back through the other transducer.

The proportional integral sequence controller (PI controller), provides 13.9 VDC power from terminal “VDC” to each pressure transducer. The transducer has an output signal of 0-10 VDC, which connects to the PI controller at terminal “SN”. The PI controller regulates the output signal to the variable frequency drive based on a fixed setpoint of 240 PSI. The output signal from the PI controller is 4-20ma at the “I” terminal. The input terminal on the variable frequency drive is the “9” terminal. The PI controller will vary the output to maintain a minimum discharge pressure of 240 PSI.

The Proportional Integral Sequence controller is factory set for direct acting operation (the signal output increases as the pressure signal increases). DIP switch setting is factory set for C1 (switch 4 to ON position, all others OFF). This is the fastest integration time available, designed to compensate for extremely rapid rates of change. The Throttling range is factory set to 20 PSIG (adjustable from 10 to 100 PSIG). The minimum output is factory set for 2VDC (20%) which is adjustable from 0 to 6VDC (0 to 60%).

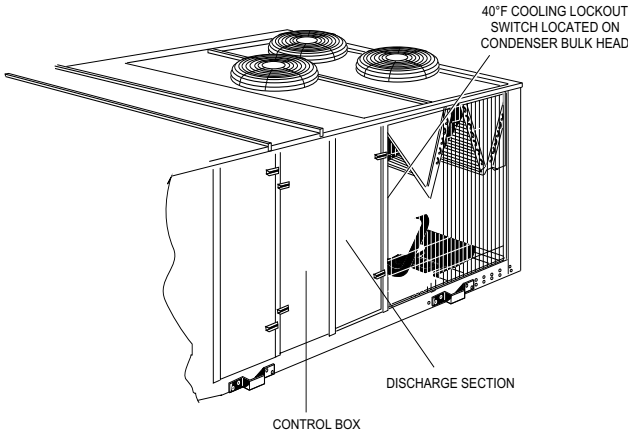

FIGURE 1 - COOLING LOCKOUT SWITCH LOCATION

NOTE: ALTERING THE FACTORY SETTINGS COULD RESULT IN POOR CONTROL OR OPERATION OF THE SYSTEM.

No special motor is required on the 208-230/460 volt units. The 208-230 volt variable frequency drive requires single-phase input power and it produces three-phase variable output power to condenser fan motor #1. The 460-volt variable frequency drive requires three-phase input power and produces three-phase variable output power to condenser fan motor #1. On the 575-volt and 380volt 60-hertz units a transformer is used to reduce line voltage to 230 volts.

This instruction provides all the necessary information to properly field install a low ambient head pressure control on the units indicated above. All of the components required to install this kit are provided in the kit. Refer to Table 1 for control application data and Table 2 for the components that are supplied in the respective accessory.

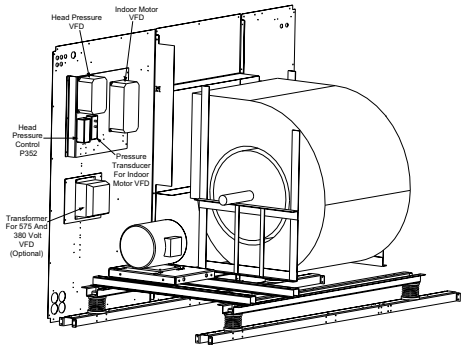

FIGURE 2 - MOUNTING LOCATION OF HEAD PRESSURE CONTROL

INSTALLATION

⚠WARNING

To prevent bodily injury or damage to the unit, turn unit power off at the disconnect.

INSTALLING THE 0°F COOLING LOCKOUT SWITCH

1. Mount the 0°F Cooling lockout switch (CLO2) next to the 40°F Cooling lockout switch (CLO1) on the condenser bulkhead panel. (See Figure 1)
2. Feed CLO2 wires through the same bushing used by CLO1 into the electrical control box.
3. Disconnect wire 259/BL from LOR1-A and connect it to LOR2-A.
4. Remove wire 319/BL between LOR1-A and LOR2-A.
5. Connect CLO2 wire to 258/Y for VAV/VFD units or wire 252/Y for CV units and connect 496/BL to LOR1-A. (Refer to Figure 5)

INSTALLING THE HEAD PRESSURE CONTROL ASSEMBLY

1. Locate the 4X4 conduit box opposite the control box in the Supply blower section (Figure 2). The 4X4 conduit box provides access to the #1 condenser fan power wiring.

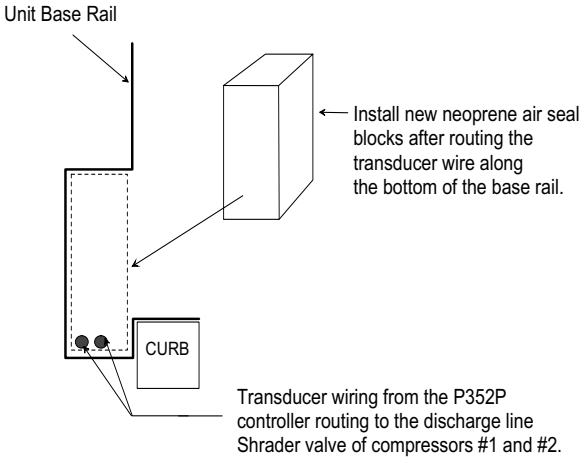

FIGURE 3 - TRANSDUCER WIRE ROUTING

2. Mount the Head Pressure Control assembly on the sheet metal panel approximately 2-4" to the right of the 4X4 conduit box. (Fig. 2)

3. Remove the 4X4 box cover and pull out the wires.

NOTE: Refer to wiring diagram 035-16194-000 for steps 4 - 15.

4. Disconnect wire 191/BK from wire 116/BK.
5. Connect wire 191/BK to T1/4.
6. Connect wire 116/BK to L1/R.
7. Disconnect wire 192/BR from wire 117/BR.
8. Connect wire 192/BR to T2/V.
9. Connect wire 117/BR to L2/S.
10. Disconnect wire 193/PR from wire 118/PR.
11. Connect wire 193/PR to T3/W.
12. Connect wire 118/PR to L3/T.
13. Disconnect ground wires 82 and 83 from one another.
14. Connect ground wire 82 to G/E.
15. Connect ground wire 83 to G/E.

INSTALLING THE PRESSURE TRANSDUCERS

1. Remove both pressure transducers from their shipping position on the sheet metal cover.

⚠ CAUTION

Do not remove the plastic plugs from the transducers until they are ready to connect to the shrader tees.

2. Remove Neoprene air seal blocks. (See Figure 3)
3. Route the pressure transducers along the inside bottom of the base rail channel to the compressor discharge lines. (See Figure 3)
4. Replace neoprene air seal blocks.
5. Install each pressure transducer to a tee connector using Red Loctite #554 thread sealant (for use with R22 refrigerant systems). To ensure a proper seal, install the flare gasket shown in Figure 4.
6. Install one tee connector (with the transducer) on the spare shrader fitting located on the #1 compressor discharge line using Red Loctite #554 thread sealant (for use with R22 refrigerant systems).

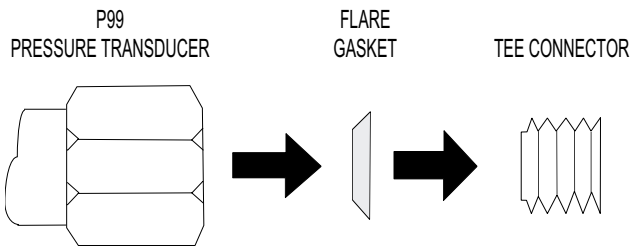

FIGURE 4 - PRESSURE TRANSDUCER INSTALLATION

NOTE: The pressure transducers are connected in parallel at the controller, therefore it does not make a difference which transducer is installed on system #1 or #2.

7. Install the other tee connector (with the transducer) on the spare shrader fitting located on the #2 compressor discharge line using Red Loctite #554 thread sealant (for use with R22 refrigerant systems).

TESTING

1. Connect a pressure gauge to the discharge line of compressor #1.
2. Connect a pressure gauge to the discharge line of compressor #2.
3. Restore power to the unit.
4. Observe condenser fan operation upon a call for first stage cooling.
5. Check condenser fan #1 for proper rotation.
6. Monitor discharge pressure on system #1 and #2, the P352P controller will try to maintain a pressure of 225-PSI +/- 20 PSI.

Sequence of Operation

A call for first stage cooling powers the 6M contactor powering the variable frequency drive. The drive will ramp to the preprogrammed minimum speed of 10 hertz immediately upon start up. The drive is preprogrammed for a minimum speed at 10 hertz and a maximum speed at 60 hertz.

As the discharge pressure rises above 240 PSI during start up on system #1 or #2 compressor, then the PI controller will increase the output signal to the variable frequency drive. The drive will increase the speed of condenser #1 fan accordingly.

The scroll compressor produces a rapid rise in discharge pressure upon start up and this, most often times, will result in full speed operation of condenser fan #1. After the discharge pressure has settled out, the speed of condenser #1 may decrease especially during times when the ambient temperature is below 80°F. After the #1 system has stabilized and compressor #2 is energized, usually the speed on condenser fan #1 will increase, compensating for the discharge pressure rise.

As the discharge pressure begins to fall below the 240 PSI setpoint, the drive will reduce the speed of condenser fan #1.

As the ambient temperature drops below 40°F the #1 condenser fan will slow to the minimum speed. The #2 condenser fan will disengage when the discharge pressure drops below 180 PSIG as the ambient temperature falls. The discharge pressure of system #1 and/or #2 will increase when condenser fan #2 is disengaged.

PROBLEM	POSSIBLE CAUSE / SOLUTION
1) Discharge pressure is high, condenser fan #1 RPM is slow.	1. Check pressure transducer connections at the P352 controller, white wire connects to terminal “SN”, brown wire connects to terminal “VDC” and the green wire connects to TB9.
2) Variable frequency drive is operating at 10 hertz (read out on display) with high discharge pressure.	2. Check diode on the transducer signal wire (white) for correct position. The cathode end (visible band at the end of the diode) should face toward the wire end, away from the transducer.
	3. Check power to the P352 controller at the 24 VDC and COM terminals.
	4. Check connection from P352 controller to the variable frequency drive.
	5. Check transducer connection. Valve depressor may not be contacting/depressing the valve core. Check to ensure the transducer has 14 VDC power to it on the brown wire from the P352 controller terminal VDC. Check the voltage out from the transducer on the white wire. Voltage should be above 1 VDC.
3) Condenser fan operates in the reverse direction.	1. Power leads to drive (VFD) are phased improperly. Switch any two leads.
4) Condenser fan motor does not operate.	1. Check power to the drive.
	2. Power leads to drive may be reversed. Wires 191, 192 and 193 should connect to U/T1, V/T2, and W/T3. Wires 116, 117 and 118 should connect to L1/R, L2/S, and L3/T. **NOTE: If the power lead (116, 117 and 118) from the contactors are connected to U/T2, V/T2, and W/T3, the drive will be permanently damaged.**

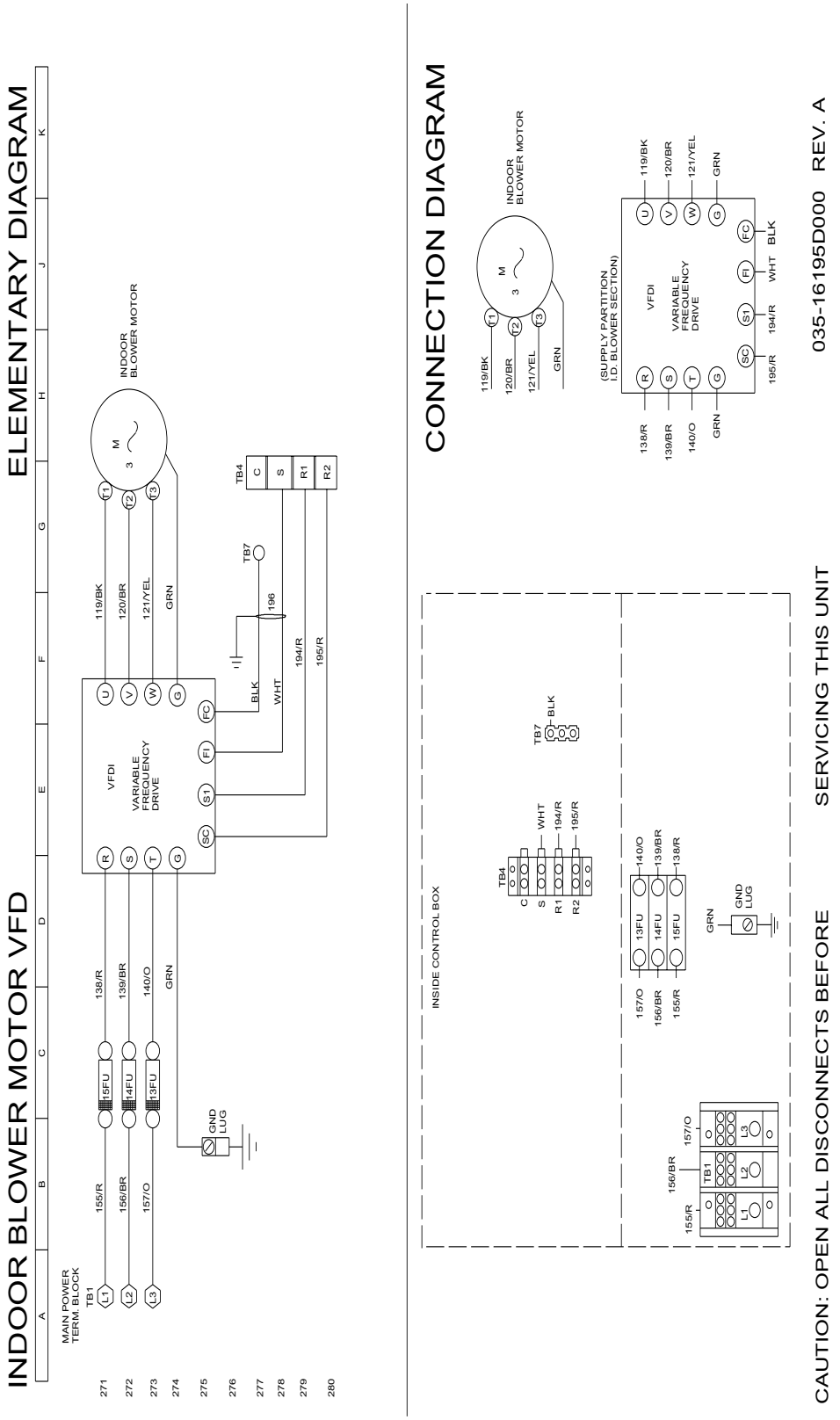

FIGURE 5 - WIRING DIAGRAM

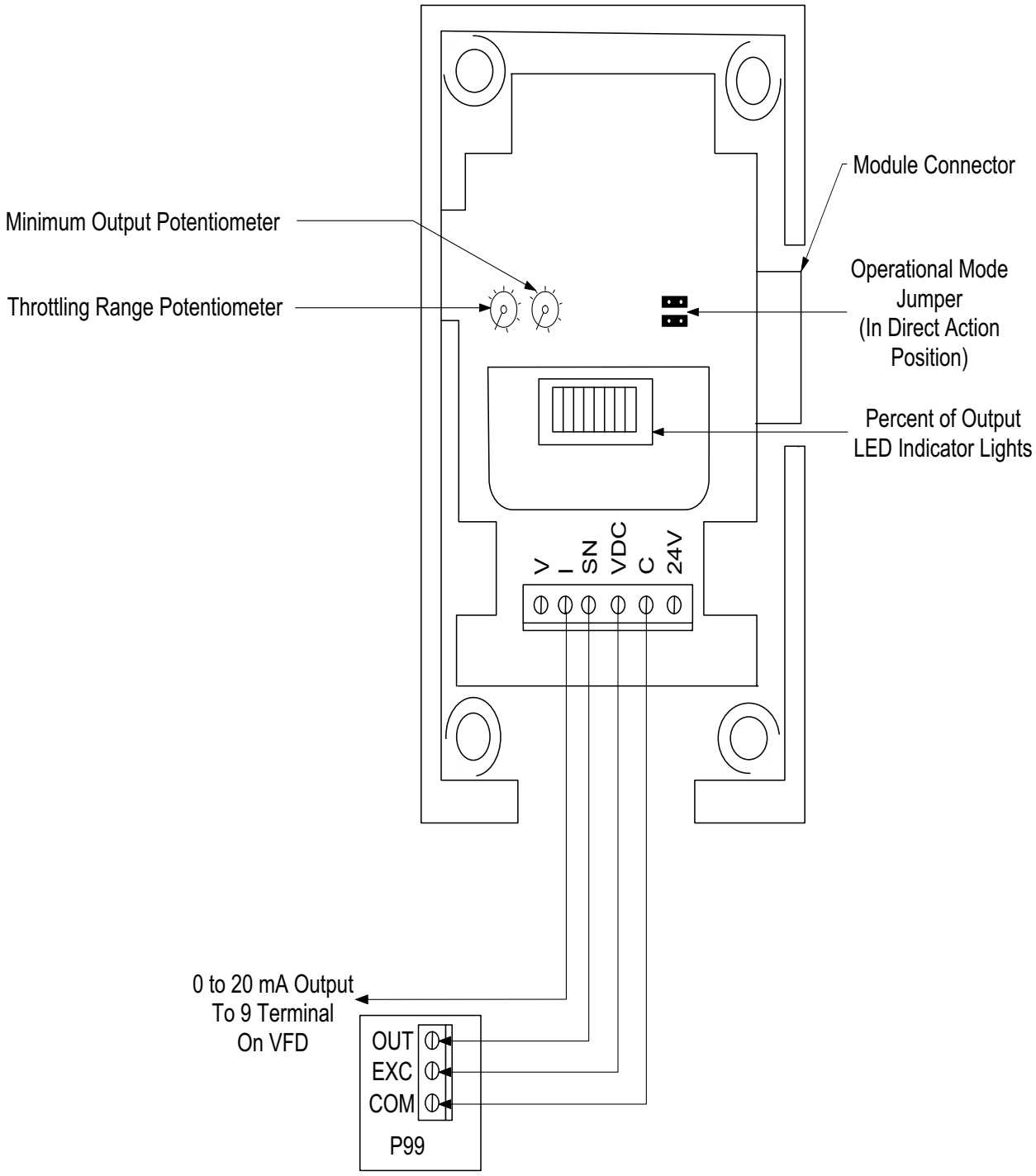

FIGURE 6 - P352 PRESSURE CONTROL

 Supersedes: 530.70-N1.8Y (699) 035-15635-001-A-0901

Unitary Product Group | **5005 York Drive** | **Norman OK 73069**