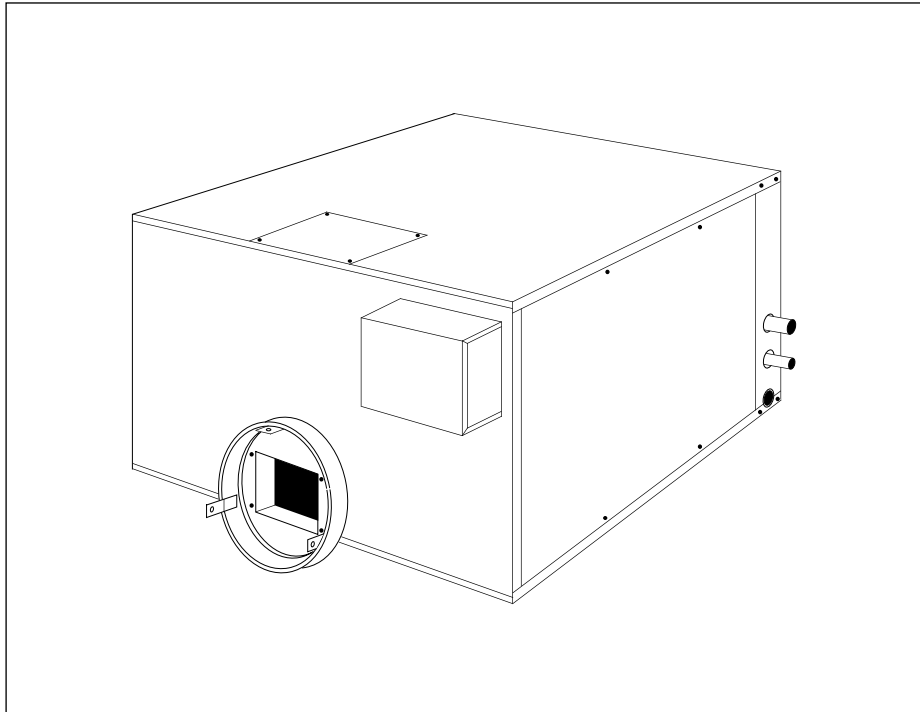


SPACE PAK[®]

A MESTEK COMPANY



MODEL "ESP-D" FAN COIL UNIT TROUBLESHOOTING GUIDE

Systematic troubleshooting is a logical series of steps to follow in analyzing a problem in the Space-Pak central air conditioning system with a minimum amount of lost time or call backs. Although the owner's initial complaint, most of the time, will be NO COOLING, INSUFFICIENT COOLING or NOISE, there are certain visible and audible symptoms which you can use to pinpoint the problem. This troubleshooting guide provides you with step-by-step procedures, written in the proper sequence for each condition, for solving the situation which you may observe. Depending on the situation involved, upon arrival at the service call, we recommend checking these three most obvious items first:

1. Check that thermostat is calling for cooling and fan switch is in the **AUTO** position.
2. Check that thermostat is set below room temperature.
3. Check for tripped circuit breaker or blown fuse at main fuse box and at condensing unit disconnect box.

In addition to the usual assortment of refrigeration system service tools, Space-Pak troubleshooting also requires the use of a volt-amp-ohmmeter and a U-tube manometer.

SERVICE CALL CONDITIONS

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CONDITION: ESP-D & CONDENSING UNITS RUN, BUT COOLING INSUFFICIENT

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Low Suction Pressure	Check blower motor as described on page 6 in this manual.	If defective, replace motor.
	Check that filter in return air box is clean.	Clean air filter.
	Check system refrigerant charge.	Charge to proper subcooling according to manufacturer's instructions.
	Check for dirty evaporator coil.	Clean evaporator coil.
High Suction Pressure	Check for air bubbles in system refrigerant.	Charge to proper subcooling according to condensing unit manufacturer's instructions. Install sight glass near indoor unit and monitor.
	Check calculated heat gain to be sure that equipment is sized properly.	Take necessary action.
	Check for obstructions near condensing unit which could cause recirculation of air.	Remove obstructions.
Low Head Pressure	Check system refrigerant charge.	Charge to proper subcooling according to condensing unit manufacturer's instructions.
	Check calculated heat gain to be sure that equipment is sized properly.	Take necessary action.

ESP-D & CONDENSING UNITS RUN, BUT COOLING INSUFFICIENT (Continued)

POSSIBLE CAUSE	VERIFICATION	SOLUTION
High Head Pressure	Check condenser fan motor according to condensing unit manufacturer's instructions.	If defective, replace fan motor.
	Check for dirty condensing unit coil.	Clean condensing unit coil.
	Check system refrigerant charge.	Charge to proper subcooling according to condensing unit manufacturer's instructions.
	Check for dirty evaporator coil.	Clean evaporator coil.
	Check for obstructions near condensing unit which could cause recirculation of air.	Remove obstructions.
	Check for restricted liquid lines.	Remove restrictions and kinks from lines.
Distribution System Air Leaks	Check all joints in air distribution system.	Make sure all joints are air tight. Verify static pressure as described on page 6 in this manual.

CONDITION: ESP-D UNIT & CONDENSING UNIT WILL NOT START

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Thermostat Not Level	Check level of thermostat	If necessary, level thermostat.
Defective Thermostat	With volt meter, check resistance of thermostat contacts.	If resistance, thermostat is O.K.
		If no resistance, replace thermostat.
Loose Low Voltage Wiring	Check all wiring connections for tightness.	Tighten all loose connections.
Defective Blower Relay	Check relay as described on page 6 in this manual.	If defective, replace relay.
Defective Low Voltage Transformer	Check transformer as described on page 6 in this manual.	If defective, replace transformer.
Inadequate Electrical Service	Check electrical service against minimum requirements.	Replace electrical service with adequately sized service.

CONDITION: ESP-D UNIT WILL NOT START, BUT CONDENSING UNIT RUNS

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Shorted Or Broken Wiring	Check wiring.	If necessary, repair or replace wiring.
Loose Low or High Voltage Wiring	Check all wiring connections for tightness.	Tighten all loose connections.
Defective Blower Motor	Check motor as described on page 6 in this manual.	If defective, replace motor.

CONDITION: ESP-D UNIT RUNS, BUT CONDENSING UNIT WILL NOT START

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Defective Thermostat	With volt meter, check resistance of thermostat contacts.	If resistance, thermostat is O.K.
		If no resistance, replace thermostat.
Loose Low Or High Voltage Wiring	Check all wiring connections for tightness.	Tighten all loose connections.
Float Switch (If Used) And Anti-Frost Switch (Switches are wired in series)	Thermostat fan ON. With volt meter, check for 24v across terminal 1 on the fan relay and terminal 7 on low voltage terminal strip.	If no voltage, fan relay is defective. Replace it.
		If read 24v, relay is O.K.
	With volt meter, check for 24v across terminals 1 and 7 on low voltage terminal block.	If no voltage, check coil for ice and drain pan for excessive water. If ice check air filter, return air duct & blower motor for air flow. If excessive water check and clean condensate drain lines.
		If no ice on coil and water level in drain pan is normal, check each switch for continuity. If switch has no continuity, replace it.
		If 24v, switches are O.K.
Shorted Or Broken Wiring	Check wiring.	If necessary, repair or replace wiring.
Condensing Unit	Check according to manufacturer's instructions.	Repair or replace as directed by manufacturer.

CONDITION: ESP-D UNIT WILL NOT START, BUT CONDENSING UNIT CYCLES

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Incorrect Low Voltage Connections	Check low voltage connections against wiring diagram.	Correct low voltage connections.
Loose Low Voltage Connections	Check all wiring connections for tightness.	Tighten all loose connections.
Defective Blower Relay	Check relay as described on page 6 in this manual.	If defective, replace relay.
Defective Blower Relay	Check motor as described on page 6 in this manual.	If defective, replace motor.

CONDITION: ESP-D UNIT CYCLES, BUT CONDENSING UNIT RUNS

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Blower Motor	Check motor as described on page 6 in this manual.	If defective, replace motor.
	Check motor amps and compare to nameplate ratings.	If excessive, the motor may be overloaded. Check supply duct for breaks or leaks.

CONDITION: ESP-D UNIT RUNS, BUT CONDENSING UNIT CYCLES

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Anti-Frost Switch & Float Switch (optional). Switches Are Wired in Series.	Thermostat fan ON. With volt meter, check for 24v across terminal 1 on the fan relay and terminal 7 on low voltage terminal strip.	If no voltage, fan relay is defective. Replace it. If read 24v, relay is O.K.
	With volt meter, check for 24v across terminals 1 and 7 on the low voltage terminal block.	If no voltage, check oil for ice and drain pan for excessive water. If ice check air filter, return air duct & blower motor for air flow. If excessive water check and clean condensate drain lines. If no ice on coil and water level in drain pan is normal, check each switch for continuity. If switch has no continuity, replace it If 24v, switches are O.K.
Thermostat in Wrong Location	Check that thermostat is in vicinity of return air box.	If necessary, relocate thermostat.
Loose Low Or High Voltage Wiring	Check all wiring connections for tightness.	Tighten all loose connections.
Defective Blower Motor	Check motor as described on page 6. in this manual.	If defective, replace motor.
Condensing Unit	Refer to manufacturer's instructions.	Repair or replace per manufacturer's instructions.

CONDITION: SWEATING AT ESP-D UNIT SUPPLY OUTLET

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Air Leak At Supply Air Plenum Flange	Check taped joint at receiving collar.	Tape joint properly.
Insulation at Outlet Not Installed	Check for insulation at outlet.	Install insulation.

CONDITION: EXCESSIVE NOISE AT TERMINATOR

POSSIBLE CAUSE	VERIFICATION	SOLUTION
High Supply Air Plenum Static Pressure	Check static pressure as described on page 6 in this manual.	Check for and add flow restrictors as necessary in supply runs.
		If necessary, add additional outlets.
Sound Attenuating Tube Not Installed	Check for installation of sound attenuating tubing.	Where necessary, install sound attenuating tubing.
Tight Radius In Sound Attenuating Tubing Or In Supply Tubing	Check all tubing for tight radius.	Where necessary, correct radius.
Incorrect Supply Tubing Length	Check that all supply tubing runs are 6' minimum.	Where necessary, correct supply tubing length.
Improperly Balanced System	Check that correct size orifices have been installed.	Properly orifice supply tubing runs.

CONDITION: EXCESSIVE NOISE AT RETURN AIR GRILL

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Return Air Duct Not Installed Properly	Check for minimum 90° bend in return air duct.	Correct bend in return air duct to minimum 90°.
Dirty Return Air Filter	Remove and inspect.	Clean air filter.

CONDITION: EXCESSIVE VIBRATION AT ESP-D UNIT

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Noisy Blower Motor Assembly	Check blower motor assembly.	Tighten all fasteners.
	Check blower motor for bearing noise.	Replace motor.
	Check for loose or damaged blower wheel.	Tighten or replace blower wheel as necessary.

CHECKING ESP-D BLOWER MOTOR

- With volt meter, check voltage at terminals L₁ and L₂ on line voltage terminal block. Voltage should be ±10% of ESP-D unit nameplate rating.
- Disconnect power to the ESP-D unit at the disconnect switch.
- Disconnect motor lead at terminal L₁.
- With an ohmmeter, check continuity between the disconnected motor lead and terminal 4 on the fan relay.
 - If continuity, precede to Step 5 below.
 - If no continuity, feel the motor to see if it is excessively warm which would indicate the internal over- load may be open. When motor has cooled, check again to make sure you did not get a false reading. If no continuity, motor is defective.
- With an ohmmeter, check each motor lead to ground to be sure motor is not grounded.
 - If not grounded, precede to Step 6 below.
 - If grounded, motor is defective.
- Check capacitor, if capacitor is suspect, replace it with a capacitor of similar rating of motor operates normally, make a permanent capacitor replacement.
- Reconnect all electrical leads, restore electrical services to the ESP-D unit, and place thermostat fan switch in the **ON** position.
- With an ampmeter, check that amp draw compares with ESP-D unit rating plate. Amp draw shown on plate is the actual running amps for a cooling-only installation with an external static pressure of 1.5" W.C.

CHECKING ESP-D BLOWER RELAY

The ESP-D unit is equipped with a time-delay blower relay. Wait one full minute after turning on power for relay to close.

- With a volt meter, check 24v across terminals 5 and 7 on the low voltage terminal block.
 - If read 24v, precede to Step 2.
 - If no voltage, check low voltage transformer.
- With a volt meter, check 24v across terminals 5 and 6 on the low voltage terminal block.
 - If read 24v, precede to Step 3.
 - If no voltage, check thermostat fan circuit.
- Check for 230v* across terminal 4 on blower relay and terminal L₁.
 - If reading is 230v, blower relay is O.K.
 - If no reading, replace the relay.
 - * 208v on 208 line volt systems.

CHECK ESP-D LOW VOLTAGE TRANSFORMER

- With volt meter, check for 230v across terminals L₁ & L₂ on the line voltage terminal block.
 - If reading 230v, precede to Step 2.
 - If no voltage, check the power supply to the unit.
- With volt meter, check for 24v across terminal 5 and terminal 7 on the low voltage terminal block.
 - If read 24v, transformer is O.K.
 - If no voltage, replace transformer.

CHECK EXTERNAL STATIC PRESSURE

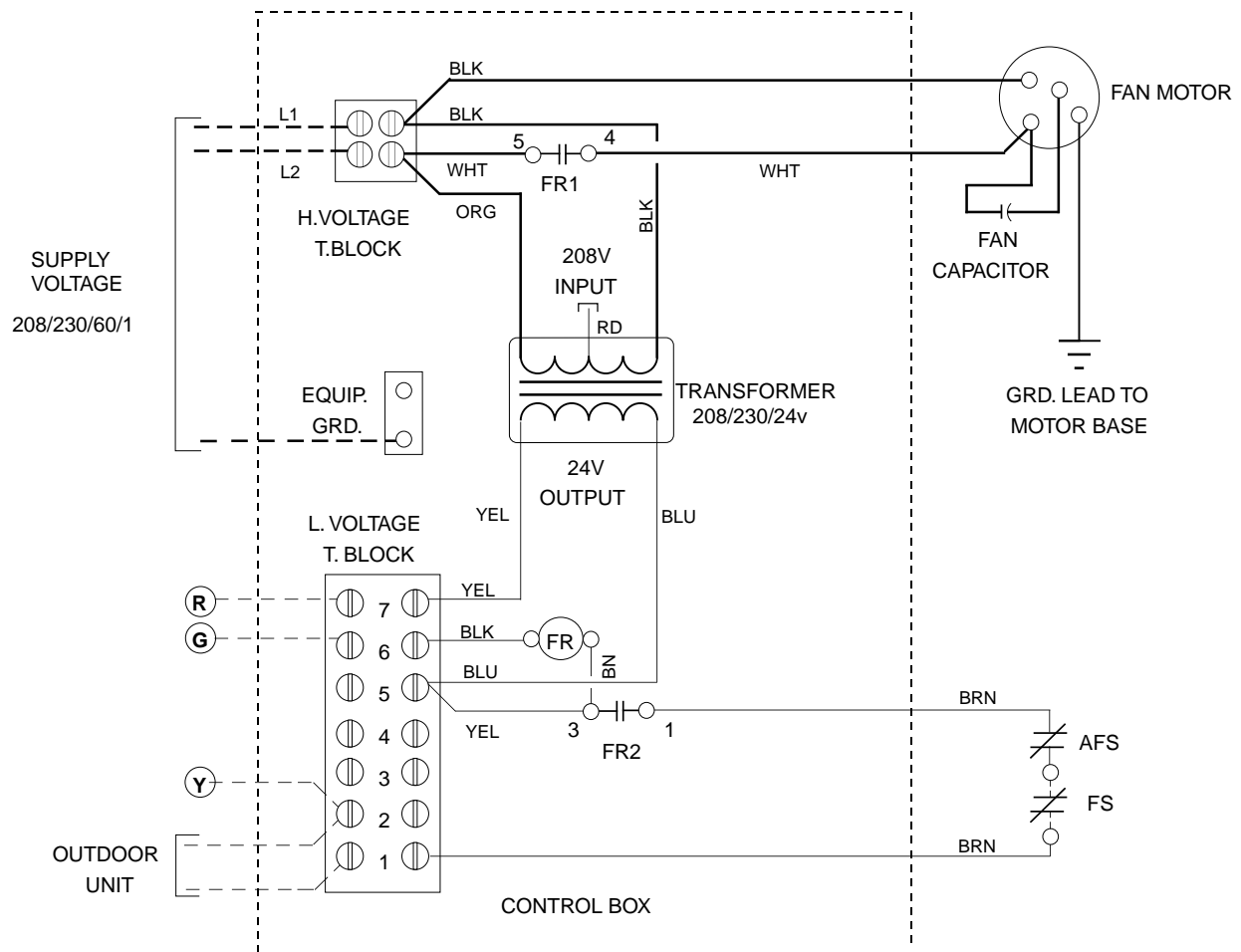
You can use a U-tube manometer to check the external static pressure on the duct system.

- Puncture a 1/4" hole in the plenum duct at least 18" (or after the tee on ESP-4860D systems) from the fan coil unit.
- Insert one manometer tube into the hole until the end of the tube is flush with the inside wall of the plenum duct.

3. System static pressure should be between 1.0" and 1.5" W.C.
- a. If greater than 1.5" W.C. add additional supply runs.
 - b. If less than 1.0" W.C. check the return air filter is

clean and return air duct is not collapsed or kinked.

- c. Check supply air plenum for leaks.
- d. If more supply runs than recommended are used, check that flow restrictors are in place.



WIRING LEGEND

- | | | | | |
|-----|-------------------|-----|-------------------------|--|
| --- | FIELD NEC CL-1 | FR | FAN RELAY | |
| --- | FIELD NEC CL-2 | FS | FLOAT SWITCH (OPTIONAL) | |
| — | FACTORY NEC. CL-1 | AFS | ANTI-FROST SWITCH | |
| — | FACTORY NEC. CL | | | |

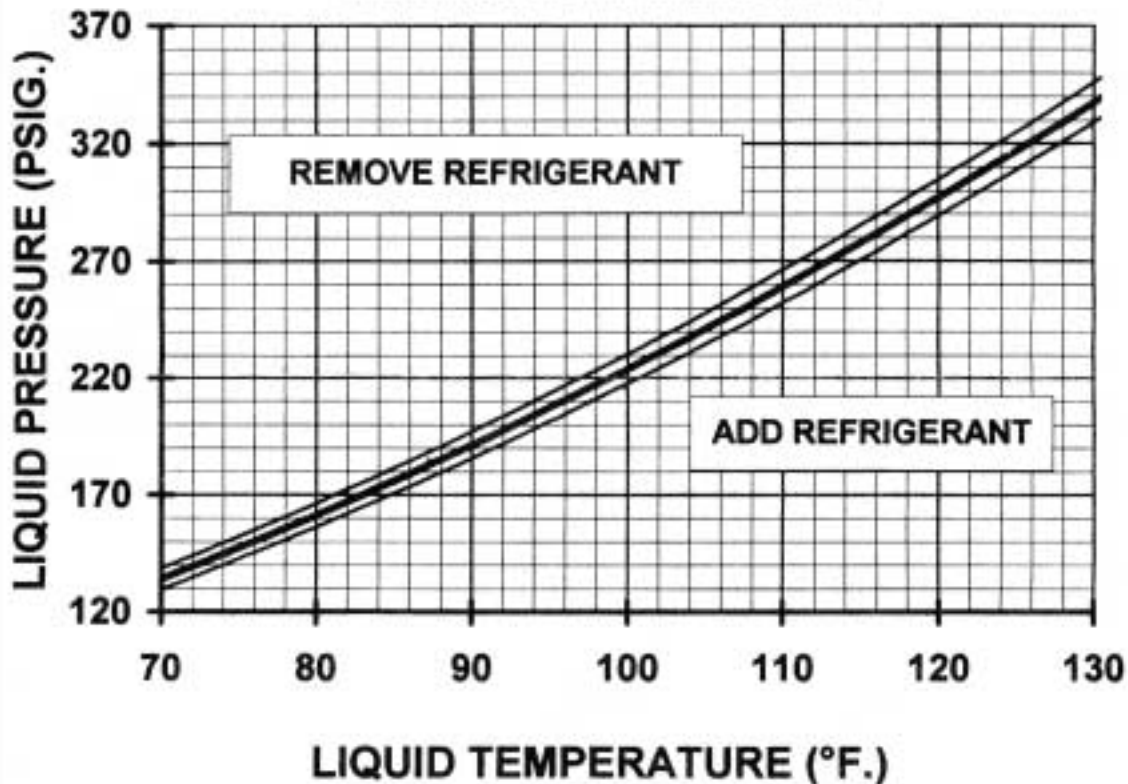
NOTES:

1. FAN MOTOR FURNISHED WITH INHERENT THERMAL PROTECTION
2. TO BE WIRED IN ACCORDANCE WITH NATIONAL ELECTRIC CODES (NEC) AND LOCAL CODES.
3. USE COPPER CONDUCTORS ONLY.
4. TRANSFORMER IS WIRED FOR 230V SUPPLY. IF 208V IS USED CHANGE TRANSFORMER PRIMARY WIRING.

ESP-D WIRING SCHEMATIC

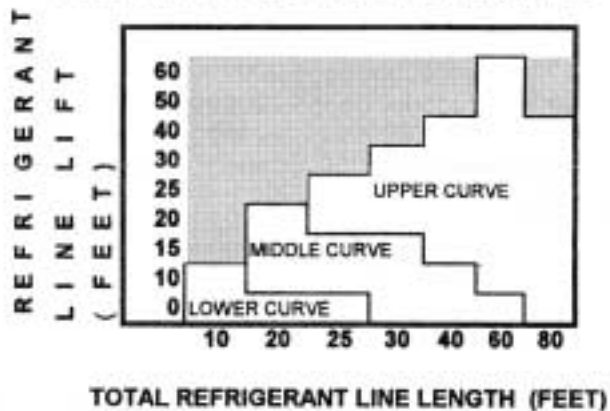
TXV REFRIGERANT CHARGING CURVE

For charging outdoor units at above 65 F outdoor temperature
in cooling mode and with indoor TXV .



- 1 Measure Liquid Line Temperature and Refrigerant Pressure at service valves.
- 2 Determine total refrigerant pipe length and height (lift) if indoor section is above the condenser. Plot the intersection of the two points on the Curve Selection Chart to determine which curve to use.
- 3 Plot the pressure and temperature on the TXV Charging Curve.
- 4 If the lines cross above the curve remove refrigerant, if below curve add refrigerant.
- 5 Whenever charge is removed or added, the system must be operated for a minimum 20 minutes to stabilize before additional measurements can be made.
- 6 When system is correctly charged refer to System Performance Curves to verify charge and performance.

CHARGING CURVE SELECTION CHART



L155Y00
DISTR T-1
A150999P01 REV.0

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