SMART FAMILY OF COOLING PRODUCTS
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TACLA14492C | Registered dba of Combined Refrigeration, Inc.

SMT120-AHU

Rental Air Handling Unit

Installation, Operation, & Maintenance Manual

CONTENTS

INTRODUCTION

GENERAL

This manual has been prepared as a guide for installing, operating and maintaining the SMARTECH central station air-handling units. Proper installation, operation and maintenance is essential to ensure lower initial cost, longer equipment life and high overall operating efficiency.

SMARTECH rental air-handling units are designed for cooling, dehumidifying (or humidifying), heating, ventilating and filtering. It is best suited for remote cooling.

Every air handler is designed and tested by experienced engineers. It is fabricated with rigid aluminum framework and thick gauge galvanized steel panel for rugged handling operation. It is subjected to rigid quality control standards to give the most efficient, reliable and economical performance possible.

RECEIVING

All units leaving SMARTECH factory have been thoroughly checked to ensure the shipment of quality products. We guarantee that all air-handlers are properly packaged.

⚠WARNING

SMARTECH will not be responsible for any damages or loss parts in shipment or at the jobsite. Report any shipping damage to nearest SMARTECH office immediately.

Carefully inspect all shipments immediately after delivery. When damage is evident, note this fact on the carrier's freight bill and request that the carrier send a representative to inspect the damage. This may be done by telephone or in person, but should always be confirmed in writing.

The shipment should be unpacked in the presence of the agent so that the extent of damage or loss can be determined. The carrier's agent will make an inspection report and a copy will be given to the consignee for forwarding to the carrier with a formal claim. Do not report missing items until you have thoroughly checked the units because bolts, belts or other small items might be packed inside.

INTRODUCTION

HANDLING AND RIGGING

Proper handling and rigging procedure should be exercised to prevent damage. Units should be handled carefully to avoid dropping or jarring. Fan wheels, casings, coils furnished with extra protective coatings must be handled with extreme care, as damage to the coating may result in a break of continuity and compromise the performance of the protective coating. Any such rupture of coating, due to mishandling, is not covered by the warranty.

When lifting with slings, use spreader bars across the top of the units to avoid damaging panel or framework. Caution must be exercised to avoid damage to the unit. Check the weight of the units before rigging. Position the rigging cable for even weight distribution.

Each air handling unit has forklift pockets and an overhead lifting frame as shown in FIGURE 1. The air handling unit is designed in such a way stackable to a maximum of 3 units.

STORAGE

If the units are to be stored in a warehouse for more than three months, the motor shaft should be rotated once every month. Damage to the shaft motors, drive package and coil by transient load should be avoided. The elapsed time for the warranty prevails even though the units are in storage.

If equipment is stored outdoors, special care should be taken to protect against moisture, corrosion and dust. Wheels should be covered to prevent unintended location by wind. Equipment, when stored under such conditions, must be periodically inspected to prevent damage. No special precaution is required when equipment is stored indoors.

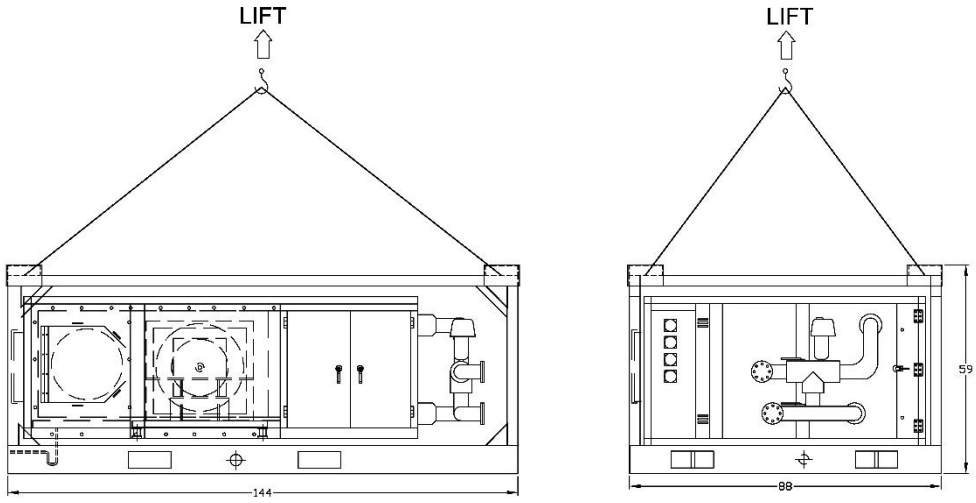
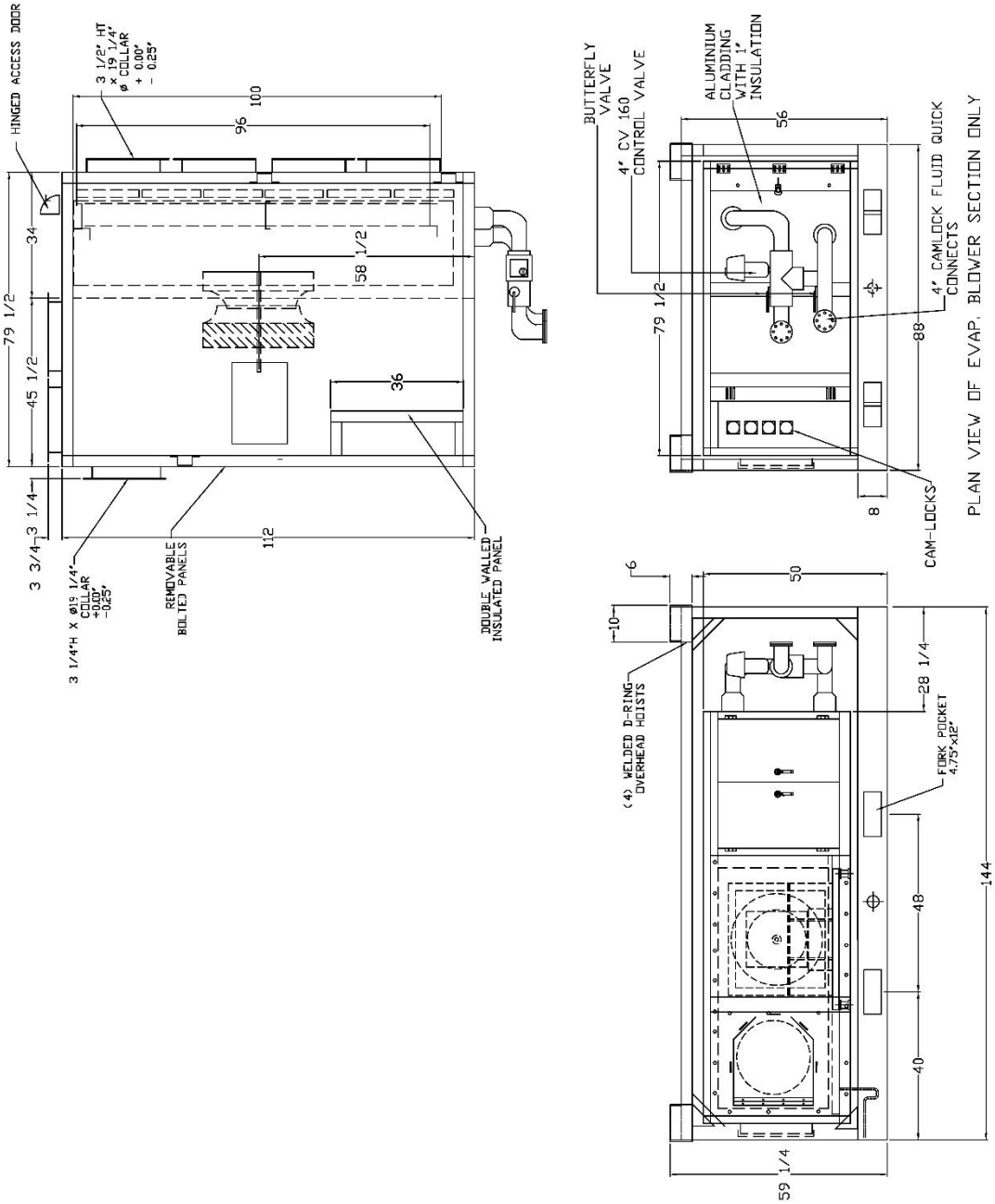


FIGURE 1

PREPARATION

UNIT DIMENSIONAL DATA [SMTAH1D 120Q]



PREPARATION

PHYSICAL SPECIFICATIONS

Model Size		SMTAH1D 120Q
Cooling Coil		
Coil Rows Deep / Face Area	Sq.ft	8 / 23.3
Blower		
Blower Diameter (Qty)	mm	630 (1)
Blower Type	mm	Direct Drive Plenum Fan, Airfoil
Blower Motor HP		30
Blower Motor RPM - 60Hz		1800
General		
Shipping Weight	kg / lbs	2455 / 5400
Operating Weight	kg / lbs	2700 / 5940

INSTALLATION

⚠WARNING

- **Do not remove access panel or door until fan is completely stopped.**
- **Ensure fans are properly grounded before working on them.**
- **Never enter and enclosed fan cabinet or reach into unit while unit is in operation.**
- **Disconnect power to the fan motor (Lock Open and Tag) before working on the motor.**
- **Disconnect power to the fan motor (Lock Open and Tag) before working on or near the heaters.**

CONDENSATE DRAIN TRAPS

Each air handling unit equipped with a built in 7/8" thread drain pipe with U-trap.

DUCT CONNECTION

Every rental unit has 19 inch diameter discharge and supply air connection and able to connect with 20 inch diameter flexible duct. Each of the air connection equipped with duct door.

COMPONENTS ARRANGEMENT

FAN SECTION

COIL SECTION

Coil sections are integral with fan section.

DRAIN PAN

The stainless steel drain pan is designed to effectively collect all the condensate and drain on either one or both sides of the unit. The pan is insulated with armaflex insulation to ensure superior thermal insulation.

* Direct-expansion coils air-cooled condensers or evaporators

FAN TYPES

Forward, Airfoil plug fans which are AMCA certified are used. You can select class I, II or III fans to meet your required air flow, static pressure, performance and sound level. Blowers shall be coupled with motors.

OPERATION

OPERATOR PANEL OPERATION PROCEDURE

STEP 1: Confirm that circuit breaker (3CB) is switched ON and CONTROL POWER pilot light (1PL) is lit.

- If not, check phase monitor relay (PMR) and emergency stop (ES) button.
- If INCORRECT PHASE pilot light (2PL) is lit, check PMR for phase rotation and voltage setting.

STEP 2: Turn VFD/OFF/BYP switch (1SW) to require blower operating mode.

- VFD RUNNING pilot light (3PL) lit if blower is started using VFD.
- BYPASS RUNNING pilot light (5PL) lit if blower is started using bypass starter.
- Check blower circuit breaker overload (1OL) or VFD status if BLOWER TRIP pilot light (4PL) is lit.

STEP 3: Set blower running speed using SPD ADJ POT (potentiometer)

It is the customer's responsibility to always follow the written operating instructions of the unit and maintain safe work practices.

OPERATION

VARIABLE FREQUENCY DRIVE (VFD)

This package unit is fitted with an inverter (VFD) to vary the blower speed. Blower speed can be adjusted via the front panel mounted potentiometer. Listed below is a quick reference for factory adjusted VFD settings. VFD Instruction Manual is enclosed and to be read in conjunction with this manual as necessary.

VFD27024 Drives Parameters:

PAR	DESCRIPTION	SET	DEFINE
1001	EXT1 COMMANDS	1	DI1
1002	EXT2 COMMANDS	0	NOT SEL
1003	DIRECTION	1	FIXED TO FORWARD
1101	KEYPAD REF SEL	1	REF 1 (HZ)
1102	EXT1/EXT2 SEL	0	EXT1 ACTIVE
1103	REF1 SELECT	1	AI 1
1104	REF1 MIN	40.0Hz	
1105	REF1 MAX	60.0Hz	***Mtr amp must not exceed rated amp**
1301	MINIMUM AI1	5.0%	5% (0.5V)
1302	MAXIMUM AI1	100.0%	100% (10V)
1303	FILTER AI1	0.1s	
1401	RELAY OUTPUT 1	4	FAULT
1404	RO 1 ON DELAY	0.3s	
1405	RO 1 OFF DELAY	0.0s	
1601	RUN ENABLE	1	DI1
1602	PARAMETER LOCK	1	OPEN, not locked.
1604	FAULT RESET	0	KEYPAD
1606	LOCAL LOCK	1	IF DI1 ACTIVE, LOCAL CONTROL DISABLED
2003	MAX CURRENT	40.8A	
2007	MINIMUM FREQ	20.0Hz	
2008	MAXIMUM FREQ	77.0Hz	
2101	STRT FUNCTION	6	SCAN START
2102	STOP FUNCTION	1	COAST
2113	START DELAY	0.00s	
2202	ACCELER TIME 1	5.0S	
2203	DECELER TIME 1	5.0S	
9902	APPLIC MACRO	1	ABB STANDARD
9905	MOTOR NOM VOLT	460V	
9906	MOTOR NOM CURR	34A	
9907	MOTOR NOM FREQ	60.0HZ	
9908	MOTOR NOM SPEED	1770rpm	
9909	MOTOR NOM POWER	22kW	

MAINTENANCE

An air handling unit, as with any mechanical equipment, requires periodic maintenance. The following is a recommended "check list" to be used as a guide in establishing a maintenance program.

ANNUAL INSPECTION

a) Tighten the blower wheel set screws. Inspect the wheels and housings for evidence of corrosion and retouch if necessary.

b) Draining and flushing of the sediment traps as well as inspection of condensate traps, vacuum breakers, air vents and valves.

c) To continually deliver full cooling & heating capacity, both the external and internal heat transfer surfaces must be maintained as clean and corrosion free as possible. The finned surface can be maintained by the use and constant inspection of pre-filters. The filters should be replaced as needed.

d) Should the finned surface become fouled, the coil can be cleaned utilizing commercially available coil cleaning fluids. Caution should be exercised in selecting the cleaning solution as well as the cleaning equipment. Improper selection can result in damage to the coil and/or health hazards. Be sure to carefully read and follow the manufacturer's recommendations before using any cleaning fluid. Clean the coil from the leaving airside so that foreign material will be washed out of the coil rather than pushed further in.

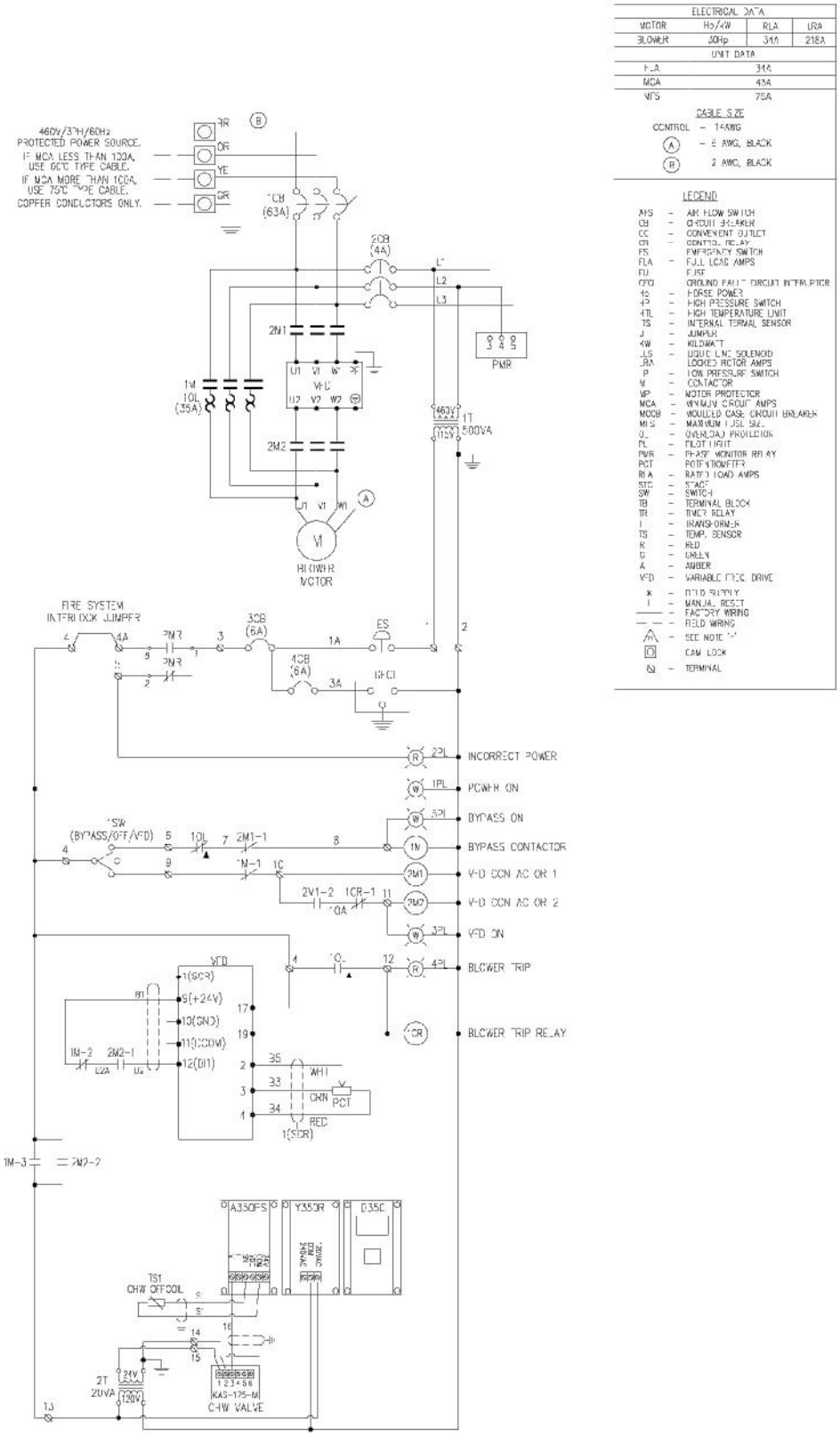
e) Internal steam coil maintenance consists primarily of preventing scale and corrosion. This is accomplished through aggressive boiler water treatment, removal of dissolved oxygen and the removal of non-condensable gasses such as carbon dioxide.

f) Check the motor and fan shaft bearings for evidence of wear.

Note:
It is recommended that all units be rebalanced to a minimum of "Quality Grade G6.3" if or wheel is replaced.

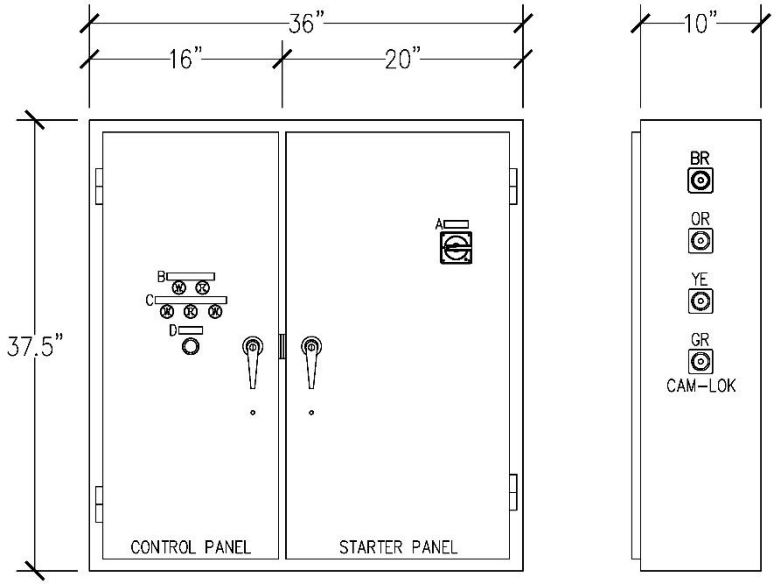
MAINTENANCE

WIRING DIAGRAM [SMTAH1D 120Q]



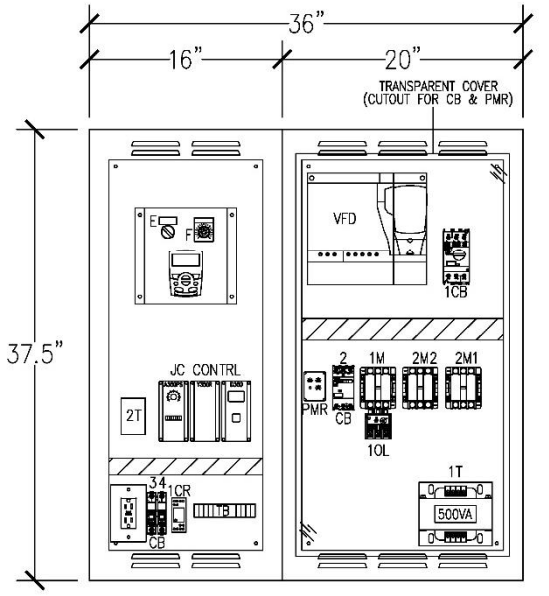
MAINTENANCE

COMPONENTS LAYOUT [SMTAH1D 120Q]



EXTERNAL VIEW

SIDE VIEW



INTERNAL VIEW

TAGS:-

- (A) MAIN CIRCUIT BREAKER
- (B) CONTROL POWER ON / INCORRECT POWER
- (C) VFD RUNNING / BLOWER TRIP / BYPASS RUNNING
- (D) EMERGENCY STOP
- (E) BLOWER VFD OFF BYP
- (F) SPD ADJ POT MIN MAX

TROUBLESHOOTING CHART

SYMPTOM	SOURCE	PROBABLE CAUSE
Noise	1. Impeller hitting inlet ring	♦ Impeller not center (check shaft clamp). ♦ Inlet ring damaged or not adjusted. ♦ Shaft loose in bearing (check locking collar). ♦ Impeller loose on shaft (check shaft clamp). ♦ Bearing loose in bearing support (check mounting bolts).
	2. Impeller	♦ Loose on shaft (check shaft clamp). ♦ Defective impeller. Do not run fan. Contact manufacturer. ♦ Unbalance. ♦ Foreign material on fan blades.
	3. Housing	♦ Foreign material in housing. ♦ Inlet cones loose or not adjusted.
	4. Electrical	♦ Lead-in cantle not secure or is too rigid. ♦ AC hum in motor or relay. ♦ Starting relay chatter. ♦ Motor bearings. ♦ Single phasing a 3-phase motor.
	5. High air velocity	♦ Fan running too fast. ♦ Static pressure lower the expected. ♦ Insufficient face area of heating or cooling coil.
	6. Obstruction in high velocity air stream may cause rattle or pure tone whistle	♦ Dampers. ♦ Registers. ♦ Loose dampers or splitters. ♦ Grilles. ♦ Sharp elbows. ♦ Sudden expansion of duct work. ♦ Sudden contraction of ductwork. ♦ Turning vanes.

TROUBLESHOOTING CHART

SYMPTOM	SOURCE	PROBABLE CAUSE
	7. Pulsation or surge	♦ Oversize ductwork. ♦ Parallel fan operation. ♦ Loose dampers or splitters. ♦ System instability. ♦ Ducts vibrate at same frequency as fan pulsations. ♦ Organ pipe action on long duct.
	8. High velocity through cracks holes or past obstructions	♦ Leaks in duct work. ♦ Registers or grilles.
	9. Rattles and/or rumbles	♦ Excessive duct velocities. ♦ Vibrating ductwork. ♦ Flex connector too tight or touching. ♦ Vibrating cabinet parts. ♦ Vibrating parts not isolated from building.
CFM low	10. Fan	♦ Impeller not centered with inlet cones. ♦ Fan speed too slow.
	11. Duct system	♦ Actual system is more restrictive (more resistance to flow) than expected. ♦ Dampers closed. Splitter rod disconnected. ♦ Registers closed. ♦ Leaks in supply ducts. ♦ Open duct seams. ♦ Insulating duct liner loose.
	12. Filters	♦ Dirty clogged (dirt, lint, snow, grass)
	13. Coils	♦ Dirty or clogged (construction trash)
	14. Recirculation	♦ Internal cabinet leaks in bulkhead separating fan outlet (pressure zone) from fan inlets (suction zone). ♦ Leaks around fan outlet at connection through cabinet bulkhead.

TROUBLESHOOTING CHART

SYMPTOM	SOURCE	PROBABLE CAUSE
	15. Obstructed fan inlets	♦ Elbows, cabinet walls or other obstructions restrict air flow. ♦ Inlet obstructions cause restrictive systems but do not cause increased negative pressure readings near the fan inlet(s). ♦ Fan speed may be increased to counteract the effect of restricted fan inlet(s).(observe fan RPM limits).
	16. No straight duct at fan outlet	♦ Fans which are normally used in duct systems are tested with a length of straight duct at the fan outlet. If there is no straight duct at the fan outlet, decreased performance will result. If it is not practical to install a straight section of duct at the fan outlet the fan speed may be increased to overcome this pressure loss. Observe fan RPM limits.
	17. Obstructions in high velocity air stream	♦ Obstruction near fan outlet. ♦ Sharp elbows near fan outlet. ♦ Improperly designed or no turning vanes. ♦ Projections, dampers or other obstructions in part of system where air velocity is high.
CFM high	18. System	♦ Oversized ductwork. ♦ Access door open. ♦ System not balanced. Resistance less than specified. ♦ Registers or grilles not installed. ♦ Filter(s) not in place.
	19. Fan	♦ Backward inclined impeller installed backward (HP will be high). ♦ Fan speed too fast.

TROUBLESHOOTING CHART

SYMPTOM	SOURCE	PROBABLE CAUSE
Static Pressure Incorrect	20. System fan or interpretation of measurements	♦ General Discussion: ♦ The velocity pressure at any point of measurement is a function of the velocity of the air and its density. ♦ The static pressure at a point of measurement in the system is a function of system design (resistance to flow), air density and the amount of air flowing through the system. ♦ The static pressure measured in a "loose" or oversized system will be less than the static pressure in a "tight or undersized system for the same airflow rate. ♦ In most systems, pressure measurements are indicators of how the installation is operating. These measurements are the result of airflow and such are useful indicators in defining system characteristics.
	21. System	♦ System has less resistance to flow than expected. This is a common occurrence. Fan speed may be reduced to obtain desire flow rate. This will reduce HP, conserve energy, and save operating costs.