AMU Operation Manual

www.colmetsb.com

888-452-6684

AIR MAKE-UP UNIT INSTALLATION, OPERATION AND MAINTENANCE MANUAL

READ MANUAL THOROUGHLY BEFORE
INSTALLING OR OPERATING UNIT

MODEL#: _____

SERIAL #: _____

UNIT TAG: _____

JOB # _____

INSTALLER AND SERVICE CONTRACTOR

WARNING: IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE, INJURY OR DEATH. READ THE INSTRUCTIONS, OPERATION AND MAINTENANCE INSTRUCTIONS THOROUGHLY BEFORE INSTALLING OR SERVICING THIS EQUIPMENT. THE SERVICE AND START-UP OF EQUIPMENT MUST BE CONDUCTED BY QUALIFIED TECHNICIANS ONLY.

NAME:	
ADDRESS:	
TELEPHONE	
FACSIMILE:	

FOR YOUR SAFETY

IF YOU SMELL GAS – OPEN ALL AREA DOORS AND WINDOWS
DO NOT TOUCH ELECTRICAL SWITCHES AND CALL GAS SUPPLIER IMMEDIATELY

FOR YOUR SAFETY

THE USE AND STORAGE OF GASOLINE AND OR OTHER FLAMMABLE VAPORS & LIQUIDS IN OPEN CONTAINERS IN THE VICINITY OF THIS EQUIPMENT IS HAZARDOUS.

THESE INSTRUCTIONS ARE TO BE USED AS A GUIDE ONLY. UNIT DESIGN IS SPECIFIC TO EACH ORDER AND ALL INFORMATION MAY NOT APPLY TO ALL UNITS. DATA IS SUBJECT TO CHANGE WITHOUT NOTICE. SAVE THESE INSTRUCTIONS FOR REFERENCE AND MAINTENANCE IN LEGIBLE CONDITION.

RECEIVING AND WAREHOUSE NOTES:

INSPECT THE UNIT UPON ARRIVAL FOR ANY SHIPPING DAMAGE. IF ANY PARTS ARE MISSING OR DAMAGED, MARK BILL OF LADING AS TO DAMAGE AND NOTIFY CARRIER IMMEDIATELY. IF THE UNIT CANNOT BE INSTALLED IMMEDIATELY, STORE IT AND ALL ACCESSORIES IN A CLEAN DRY PROTECTED LOCATION.

DO NOT ATTEMPT TO HANDLE OR SUSPEND UNIT UNLESS YOU ARE EXPERIENCED IN RIGGING SUCH EQUIPMENT. DO NOT HANDLE THE UNIT ATTACHING HOOKS, JACKS OR CHAINS TO THE UNIT CASING OR COMPONENTS. SPREADER BARS ARE REQUIRED WHEN USING SINGLE POINT LIFTS. SEE RIGGING AND INSTALLATION NOTES.

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UNIT INFORMATION AND SAFETY NOTES

1.0 GENERAL INFORMATION

1.1 GENERAL NOTICES

NOTE: RECIRCULATION OF ROOM AIR MAY BE HAZARDOUS IN THE PRESENCE OF FLAMMABLE SOLIDS, LIQUIDS & GASES

EXPLOSIVE MATERIALS (paint vapors, powder dust, grain dust, coal dust, gunpowder

CERTAIN SUBSTANCES MAY BECOME TOXIC WHEN EXPOSED TO HEAT (i.e. refrigerants, aerosols, etc.)

NOTE: RECIRCULATION IS NOT RECOMMENDED IN NON-INSULATED BUILDINGS

WHEN UNIT IS OPERATED IN RE-CIRCULATION CONFIGURATION (80/20), CARE MUST BE TAKEN TO ENSURE THAT A MINIMUM OF 4 CFM OF OUTSIDE VENTILATION AIR IS INTRODUCED FOR EVERY 1000 BTUH OF RATED INPUT.

THE SPECIFIC INSTALLATION AND WIRING DRAWINGS ARE LOCATED IN THE REMOTE CONTROL CABINET SHIPPED ALONG WITH THE UNIT. REMOVE AND READ THE MATERIAL PRIOR TO INSTALLING THE UNIT.

1.2 INSTALLATION AND SERVICE INSTRUCTIONS

THE INFORMATION PROVIDED IS A GUIDE TO THE PROPER INSTALLATION, OPERATION AND TROUBLESHOOTING OF A COL-MET AIR MAKE-UP UNIT. RETAIN THE MANUAL AS A REFERENCE FOR OPERATION AND FOR MAINTENANCE PERSONNEL.

SHOULD CONTACT WITH THE FACTORY BE NECESSARY, CONTACT YOUR LOCAL REPRESENTATIVE AND HAVE HIM (HER) CONTACT OUR SERVICE DEPARTMENT. BE READY TO PROVIDE THEM THE UNIT MODEL NUMBER AND THE UNIT SERIAL NUMBER. THE SERIAL NUMBER CAN BE FOUND ON THE METAL MFG TAG THAT IS ATTACHED TO THE DOOR OF THE MAIN CONTROL CABINET ON THE AMU.

INSTALL AND WIRE THE EQUIPMENT IN ACCORDANCE TO THE APPLICABLE NATIONAL AND LOCAL GOVERNING BODIES' CODES. REFER TO CURRENT NEC, NFPA, ANSI AND NATIONAL GAS CODES.

AUTHORITIES HAVING JURISDICTION SHOULD BE CONSULTED BEFORE MAKING THE INSTALLATION. LOCAL CODES MAY REQUIRE SAFETY CONTROLS AND OR INTERLOCKS NOT TYPICALLY PROVIDED WITH OUR UNITS.

1.3 LOCATING UNIT

PRIOR TO LOCATING THE UNIT, CHECK WITH THE AUTHORITIES HAVING JURISDICTION.

THE UNIT SHOULD BE LOCATED WITH REQUIRED CLEARANCES FOR SERVICE AND MAINTENANCE. INSURE THAT THE UNIT IS INSTALLED LEVEL. PROVIDE ADEQUATE CLEARANCE AROUND THE UNIT FOR SERVICE TO THE BLOWER , BURNER AND GAS TRAIN.

NOTE: THE HEATER IS DESIGNED TO DISCHARGE AIR AT NORMAL TEMPERATURES UP TO 160° F AND A MAXIMUM HIGH TEMP LIMIT OF 180F. AVOID DIRECTING AIR ABOVE 100° F DIRECTLY AT PERSONNEL. IF INTRODUCING THE AIR INTO THE GENERAL BUILDING AREA DO SO AT A HEIGHT TO AVOID DIRECT DISCHARGE ON PEOPLE IN THE AREA. ENSURE PRECAUTIONS ARE TAKEN TO AVOID FIRE SUPPRESSION DISCHARGE AT ELEVATED TEMPERATURES.

ENSURE THAT THE POSITION OF THE HEATER RELATIVE TO SUPPORT BEAMS IS CORRECT SO AS TO PROVIDED ADEQUATE SUPPORT FOR THE EQUIPMENT. FOR ROOF MOUNTED UNITS, CHECK THE SPACING OF THE ROOF STRUCTURE BEAMS TO AVOID INTERFERENCE WITH AIR DUCTS.

1.4 LOCATING THE ACCESSORIES

A REMOTE PANEL SHALL BE SHIPPED WITH EACH UNIT. THIS CABINET SHOULD BE LOCATED IF POSSIBLE WITHIN CLOSE PROXIMITY TO THE MAIN UNIT SO AS TO REDUCE FIELD WIRING. THIS CABINET SHOULD BE WIRED BY A LICENSED ELECTRICIAN. THE REMOTE CONTROL PANEL CANNOT BE INSTALLED INSIDE THE BOOTH, OR WITHIN 3 FEET OF ANY OPENING ON THE BOOTH.

1.5 FACTORY TESTING & START-UP CHECKLIST

ALL SHIPMENTS ARE MADE F.O.B. THE FACTORY. THE UNIT IS SECURELY STRAPPED OR BLOCKED TO HELP PREVENT SHIPPING DAMAGE AND EACH SHIPMENT IS INSPECTED PRIOR TO LEAVING THE PLANT. ALL PARTS, WHERE FEASIBLE, ARE STRAPPED TO OT=R INCLUDED IN THE UNIT. UPON RECEIPT OF GOODS, CHECK THE SHIPMENT AGAINST THE BILL OF LADING TO INSURE ALL ITEMS HAVE BEEN RECEIVED. CAREFULLY CHECK THE UNIT FOR PHYSICAL DAMAGE IN THE PRESENCE OF THE CARRIER'S REPRESENTATIVE. SHOULD PARTS BE MISSING OR DAMAGED NOTE ON THE BILL OF LADING AND IMMEDIATELY FILE A CLAIM WITH THE CARRIER. COL-MET DOES NOT ASSUME RESPONSIBILITY FOR THE HANDLING OF THE GOODS IN TRANSIT AND IS NOT RESPONSIBLE FOR THE INITIATION OF FREIGHT CLAIMS FOR UNITS SHIPPED F.O.B. FACTORY.

NOTE: IF QUESTIONS ARISE OR INSTALLER/SERVICE PERSONNEL ARE IN DOUBT PLEASE FEEL FREE TO CONTACT YOUR LOCAL SUPPLIER OR COL-MET DIRECT AT 1-888-452-6684.

2.0 INSTALLATION

2.1 GENERAL ASSEMBLY INSTRUCTIONS

STANDARD UNITS ARE SHIPPED ASSEMBLED AND READY FOR INSTALLATION.

THE INLET HOODS USUALLY SHIP LOOSE AND REQUIRE FIELD ASSEMBLY. THE HARDWARE NEEDED TO BOLT/SCREW THE HOODS AND RELATED DUCTWORK IS PROVIDED. CARE SHOULD BE TAKEN TO AVOID INSTALLING THE INLET HOOD INTO THE PREVAILING WIND WHENEVER POSSIBLE. IF HIGH WINDS ARE PRESENT CUSTOMER MAY BE REQUIRED TO INSTALL A WIND BLOCKING DEVICE. ALSO V-BANK FILTER SECTIONS MAY BE SHIPPED SEPARATELY.

WHEN INSTALLING A VERTICAL UNIT OUTDOORS, ENSURE THAT THE UNIT IS NOT LOCATED DIRECTLY UNDER A ROOF EAVE WHERE WATER/SNOW/ICE CAN FALL DIRECTLY ONTO THE UNIT. IF THE UNIT MUST BE INSTALLED UNDER AN EAVE, INSTALL A RAIN GUTTER TO HELP RE-DIRECT THE WATER AWAY FROM THE UNIT.

WHEN A REMOTE DAMPER UNIT IS FURNISHED, THE INSTALLING CONTRACTOR WILL BE REQUIRED TO WIRE THE DAMPER MOTOR(S) TO THE UNIT'S TERMINAL BLOCK. THIS WIRING IS TYPICALLY LOW VOLTAGE 3 CONDUCTOR CABLE.

2.2 CLEARANCE

A MINIMUM OF (3) THREE FEET CLEARANCE FROM THE UNIT TO COMBUSTIBLE CONSTRUCTION MUST OBSERVED.

2.3 RIGGING AND HANDLING

THE EQUIPMENT HAS BEEN DESIGNED FOR LIFTING AND HANDLING FROM THE LIFTING EYES AND/OR FORMED BASE PAN. ALL LIFT OPERATIONS MUST UTILIZE A LOAD SPREADER WITH SUFFICIENT WIDTH TO INSURE THAT THE LIFTING CABLES CLEAR THE SIDES OF THE UNIT. IF A SPREADER IS NOT AVAILABLE, INSERT WOOD STRIPS BETWEEN THE UNIT AND THE CABLES WHERE NECESSARY. UTILIZE ALL LIFTING EYES SIMULTANEOUSLY WHEN LIFTING THE UNIT INTO PLACE.

NOTE: DURING SHIPMENT, UNLOADING AND INSTALLATION OF THE UNIT, NUTS AND BOLTS MAY HAVE BEEN LOOSENED. IT IS RECOMMENDED THAT PRIOR TO RIGGING, INSTALLING AND STARTING THE UNIT, ALL FASTENERS BE CHECKED AND TIGHTENED WHERE NECESSARY. TURN BLOWER SHAFT MANUALLY TO INSURE THAT THE BLOWER TURNS FREELY WITHOUT RUBBING OR BINDING. INSPECT THE TERMINALS AND WIRING CONNECTIONS IN THE UNIT CONTROL BOX TO INSURE THAT ALL CONNECTIONS ARE TIGHT.

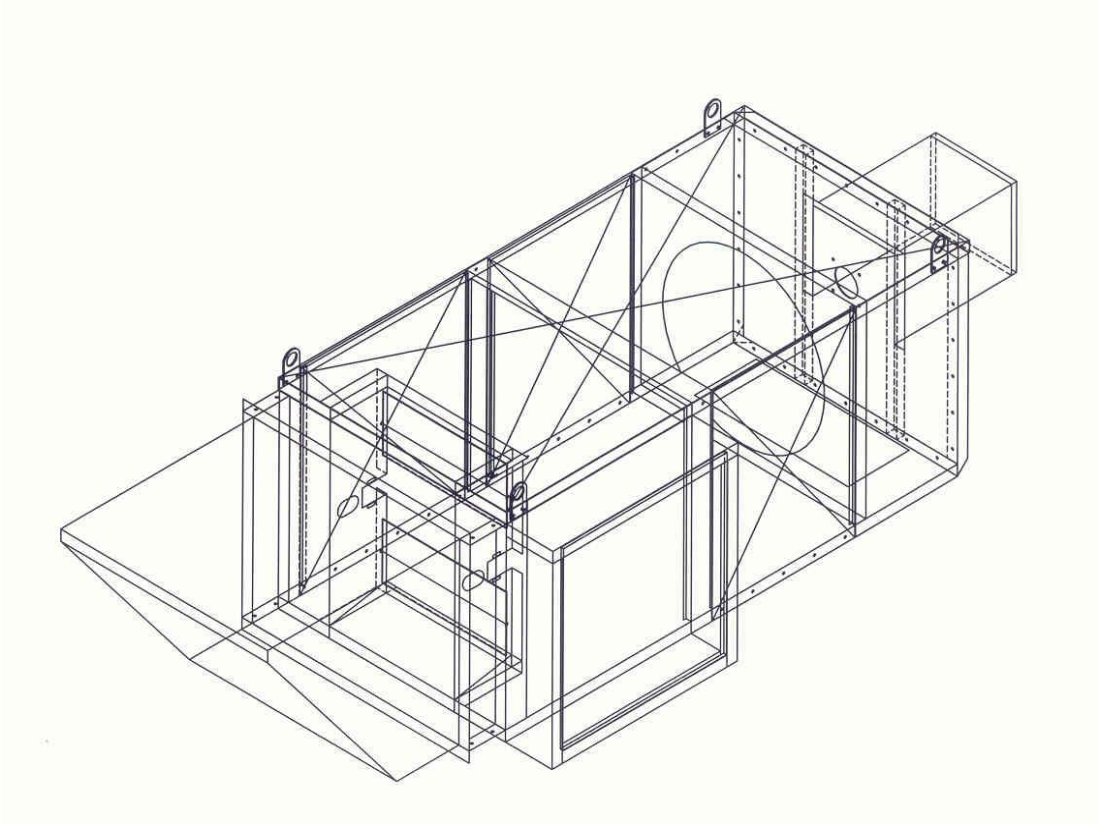
INDOOR SUSPENDED UNITS

UNIT MUST BE LIFTED EVENLY FROM THE LIFTING HOLES PROVIDED AT EACH END OF THE UNIT WHEN SUSPENDING FROM THE ROOF STRUCTURE. IF UNITS ARE TO BE LIFTED FROM THE BOTTOM FOR MOUNTING ON A PLATFORM (AS WITH A FORKLIFT), UNIT MUST BE SUPPORTED WITH TIMBERS, BEAMS OR TEMPORARY PLATFORM.

NOTE: INFORMATION FOR INSTALLATION OF HEATERS IN AIRPLANE HANGARS SHOULD BE IN ACCORDANCE WITH ANSI/NFPA 409. ALSO NOTE: INFORMATION FOR INSTALLATION OF HEATER IN PUBLIC GARAGES SHOULD BE IN ACCORDANCE WITH THE STANDARD FOR PARKING STRUCTURES, ANSI/NFPA 88A, OR THE STANDARD FOR REPAIR GARAGES, ANSI/NFPA SSB.

DO NOT LIFT CABINET WITHOUT ADEQUATE SUPPORT

RIGGING INSTRUCTIONS



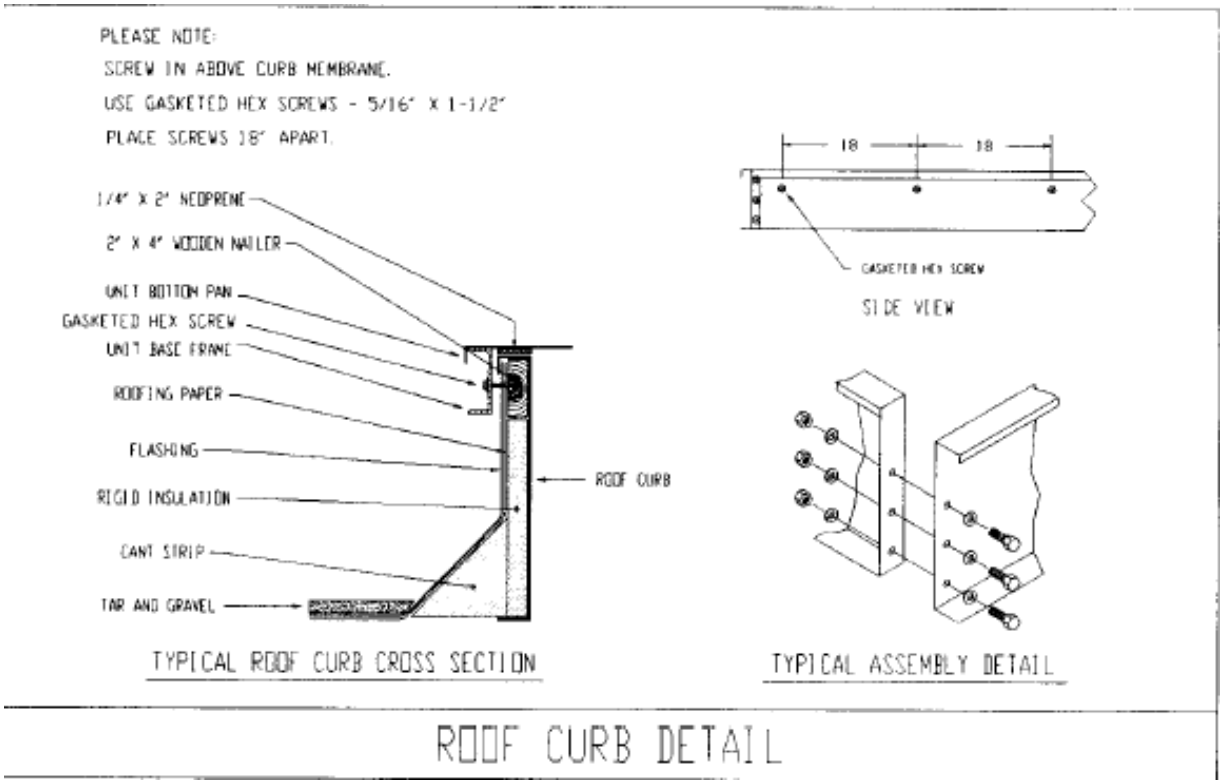
NOTE: THE MAXIMUM ANGLE PERMITTED FOR A VERTICAL LIFT IS 30 DEGREES.
NOTE: KEEP SNOW AWAY FROM INLET. AVOID PLACEMENT OF HOOD INTO PREVAILING WINDS, IF AT ALL POSSIBLE.
NOTE: FAILURE TO RIG AND SUPPORT AS DESCRIBED MAY RESULT IN METAL FATIGUE, FAILURE, PROPERTY DAMAGE, INJURY OR DEATH.

- STACK UNIT FROM LOWEST SECTION UPWARD
- FACTORY SUPPLIED CAULKING MUST BE INSTALLED IN FIELD BY CONTRACTOR/INSTALLER BETWEEN ALL DUCT SECTIONS.
- LIFTING EYES AND CHANNEL SLOTS ARE DESIGNED TO BE LIFTED STRAIGHT UP VERTICALLY
- OUTDOOR UNITS MUST BE FIELD CHECKED TO BE ADEQUATELY CAULKED WEATHER TIGHT AT ALL JOINTS, DUCT CONNECTIONS, GAS CONNECTIONS, ETC.
- ALL BOLTS MUST BE UTILIZED

2.3.1 ROOF CURB ASSEMBLY & INSTRUCTION ALL ROOFTOP UNITS ARE AVAILABLE WITH AN OPTIONAL FULL PERIMETER ROOF CURB. THIS ROOF CURB IS AVAILIABLE IN 14", 24" OR SLOPED HEIGHTS.

THE ROOF CURB IS TO BE PROVIDED BY BUILDING OWNER OR MAY BE PURCHASED SEPARATELY FROM THE FACTORY. IF PROVIDED BY THE FACTORY FOLLOW APPROPRIATE ASSEMBLY DRAWINGS AND TIGHTEN THE ROOF CURB TO THE BUILDING. RAIN TIGHT SEAL MUST BE PROVIDED BY THE BUILDING OWNER OR THE INSTALLING CONTRACTOR. CERTAIN ROOF CONSTRUCTIONS REQUIRE SPECIAL CARE AND INSTALLATION REQUIREMENTS. VERIFY THE INSTALLED UNIT HAS BEEN ASSEMBLED AND FASTENED TO THE ROOF STRUCTURE INSURE THE FOLLOWING:

1. INSTALL CURB LEVEL AND SQUARE.
2. RUN ROOF FLASHING UP UNDER FACTORY PROVIDED "DRIP LIP" AND SECURE.
3. BEFORE LOWERING UNIT ONTO ROOF CURB INSTALL GASKETING TO TOP OF ROOF CURB.
4. REFER TO SPECIFIC ROOF CURB DETAIL PROVIDE WITH CURB ASSEMBLY.
5. INSTALL INSULATION ON THE EXTERIOR OF ROOF CURB IN A SLOPED FASHION TO ALLOW WATER RUNOFF WHENEVER POSSIBLE



2.4 CONNECT DUCTWORK

2.4.1 CONNECT DISCHARGE AIR DUCT OR DISCHARGE GRILLE TO UNIT OUTLET. IF UNIT IS INSTALLED ON A ROOF, BE SURE THAT THE DUCT GOING THROUGH THE ROOF IS ADEQUATELY FLASHED AND SEALED TO PREVENT LEAKAGE. PROVIDE OUTLET SCREEN ON DISCHARGE OF DUCT GRILLE OR THE BLOWER DISCHARGE FOR SAFETY WHEN UNIT IS NOT DUCTED.

2.4.2 INDOOR UNITS MAY BE INSTALLED DIRECTLY AGAINST THE WALL OR DUCTED DIRECTLY TO A WALL LOUVER. ·

- MAKE REQUIRED OPENINGS IN WALL AND LINE WITH STEEL FRAME, PRIOR TO POSITIONING UNIT OR ATTACHING OUTSIDE AIR HOOD TO WALL EXTERIOR. THIS WILL PREVENT CRUMBLING OF WALL BRICK. ·
- INSERT INSULATED FRESH AIR "COLLAR" THROUGH OPENING WITH FLANGES TURNED OUT TO PROVIDE RIGIDITY. ·
- ANCHOR INTAKE HOOD WITH BIRDSCREEN TO WALL. ·
- CAULK PERIMETER OF OPENING TO MAKE RAIN TIGHT.
- ROOM MUST BE LEFT FOR ACCESS TO THE ELECTRICAL PANEL AND BURNER ACCESS DOORS. (LEFT AND RIGHT SIDE OF UNIT)

2.6.1 THE UNIT'S TOTAL OUTDOOR AIR CAPACITY SHALL NOT EXCEED 110% OF THE RATED CFM FOR THE BUILDING EXHAUST SYSTEM. FOR APPLICATIONS INVOLVING MAKE-UP DIRECTLY INTO A BOOTH, THE TOTAL UNIT CAPACITY SHALL NOT EXCEED THE DISCHARGE CAPACITY OF THE BOOTH EXHAUST SYSTEM.

2.6.3 CONNECT GAS SUPPLY.

2.6.4 RUN CORRECTLY SIZED GAS LINE TO UNIT. REFER TO NATIONAL FUEL CODE AND NATIONAL FIRE PROTECTION STANDARDS FOR PIPING INSTRUCTIONS. INSTALL AN APPROVED MANUAL SHUT-OFF VALVE, PLUG-COCK TYPE. **NOTE**: MINIMUM GAS LINE PRESSURE WHEN UNIT IS AT FULL INPUT IS AT LEAST 14" W.C. REFER TO UNIT SPECIFICATIONS. ALSO REFER TO UNIT SPECIFICATIONS FOR MAXIMUM GAS INPUT.

2.6.5 INSTALLING CONTRACTOR SHALL INSTALL BLEED AND VENT LINES IN ACCORDANCE TO THE APPLICABLE PIPING CODES.

2.6.6 CHECK MINIMUM AND MAXIMUM GAS INLET PRESSURE BEFORE CONNECTING GAS LINE TO UNIT. CHECK THE GAS LINE SUPPLY PRESSURE WITH A MANOMETER OR A GAUGE TO INSURE THE MAXIMUM INLET PRESSURE INDICATED ON UNIT'S SPECIFICATIONS ARE NOT EXCEEDED. ALSO, REFER TO THE UNIT'S SPECIFICATIONS TO DETERMINE THE MINIMUM GAS INLET PRESSURE REQUIRED TO OPERATE THE UNIT AT FULL FIRE. A PRESSURE READING OF THE GAS SHOULD BE TAKEN AT THE TEST PORT PROVIDED. ALSO, CHECK THE UPSTREAM PILOT LINE TEST PORT. INSURE THE UPSTREAM MAIN GAS MANUAL SHUT-OFF VALVE IS FULLY OPEN WHEN CHECKING PILOT LINE GAS PRESSURE. DO NOT EXCEED MAXIMUM INPUT FOR THE HEATER AS STATED ON THE UNIT'S SPECIFICATIONS.

2.6.8 ALL REGULATORS NOT SUPPLIED WITH A LEAK LIMITER MUST BE VENTED OUTDOORS. ALL FIELD VENTING MUST BE CONDUCTED ACCORDING TO NFPA AND NATIONAL GAS CODE.

3.0 START-UP INSTRUCTIONS

3.1 FIELD WIRING

3.1.1 POWER CONNECTION:

IF A SAFETY LOCK OUT/TAG OUT DISCONNECT IS REQUIRED, INSTALL AN ELECTRIC DISCONNECT SWITCH WITH ADEQUATE AMPACITY (REFER TO THE UNIT SPECIFICATIONS) ACCORDING TO ARTICLE 430 OF THE NATIONAL ELECTRIC CODE, ANSI\NFPA 70-1987. ON INDOOR UNITS A HOLE IS TO BE MAKE IN THE CONTROL COMPARTMENT SIDE PANEL TO BRING POWER LINES IN. THE HOLE SHOULD BE LOCATED NEAR THE ROTARY DISCONNECT LOCATED AT THE TOP RIGHT SIDE OF THE CONTROL PANEL.

ON OUTDOOR UNITS THE ELECTRICAL ENTRANCE MUST BE SEALED TO MAINTAIN WEATHER PROOF INTEGRITY TO THE CONTROL CABINET. ANY ELECTRICAL FITTINGS THAT ARE INSTALLED ON THE CONTROL PANEL ENCLOSURE MUST MEET NEMA4 RATINGS. IMPORTANT: - TERMINATION OF THE CONDUIT FOR THE POWER SUPPLY MUST BE IN THE CONTROL COMPARTMENT. (NOTE: COVER MOTOR STARTER, RELAYS, AND VFD IF DRILLING IN AND AROUND CONTROL PANEL TO AVOID DEBRIS CONTAMINATION.

3.2 CONTROL WIRING CONNECTIONS COMPLETE ALL WIRING TO ACCESSORIES (INTERLOCKS) ACCORDING TO THE WIRING DIAGRAMS PROVIDED WITH THE UNIT.

DRILL AN ACCESS HOLE IN THE CONTROL CABINET AND FILL WITH A NEMA4 RATED FITTING TO BRING THE CONTROL WIRING TO THE TERMINAL STRIP. LOCATE THE HOLE AS CLOSE TO THE TERMINAL STRIP AS POSSIBLE TO PREVENT EXCESS UNSECURED WIRING COMING IN CONTACT WITH OTHER CONNECTIONS. ONE SIDE OF THE TERMINAL STRIP WILL BE LEFT FOR FIELD CONNECTIONS.

FIELD WIRING MAY BE REQUIRED ON UNITS SPLIT FOR SHIPMENT. REFER TO UNIT WIRING DIAGRAM. ALWAYS FULLY RUN AND TEST ALL FIELD CONTROL WIRING RE: CONNECTIONS.

INSTALL REMOTE PANEL IN DESIRED LOCATION, PROVIDED IT IS NOT A HAZARDOUS LOCATION OR SUBJECT TO FLAMMABLE VAPORS OR GASES.

COMPLETE FIELD WIRING TO REMOTE PANEL AS INDICATED ON THE DRAWINGS PROVIDED WITH THE UNIT.

NOTE: (USE A SEPARATE CONDUIT OR SHIELDED WIRE WHEN REMOTE CONTROLS OPERATE ON mA or Vdc, CONTROL SIGNALS.

3.21 SUPPLY PRESSURE TESTING

DISCONNECT GAS PIPING TO THE UNIT AND MAIN SHUT-OFF VALVE WHEN PRESSURE TESTING 'GAS SUPPLY SYSTEMS OVER IA PSIG.

THE UNIT CAN BE ISOLATED FROM THE GAS SUPPLY SYSTEM BY CLOSING THE INDIVIDUAL MANUAL SHUTOFF VALVE DURING ANY PRESSURE TESTING OF THE GAS AND SUPPLY SYSTEM OF IA PSIG AND BELOW. REFER TO THE HEATER

RATING PLATE FOR DETERMINING THE MINIMUM GAS SUPPLY PRESSURE FOR OBTAINING THE MAXIMUM GAS CAPACITY FOR WHICH THE HEATER IS SPECIFIED.

3.21.1 START-UP PROCEDURE

3.3.1 REMOVE SHIPPING BLOCKS FROM BLOWER OR VIBRATION ISOLATORS:

3.3.2 INSURE THAT MAIN FIRING VALVE IS CLOSED, BUT THAT GAS IS AVAILABLE IN THE SERVICE LINE.

3.3.5 CLOSE THE MAIN DISCONNECT SWITCH.

3.3.6 TURN THE “LIGHTS” SWITCH TO THE ON POSITION AND CONFIRM THAT THE LIGHTS IN THE BOOTH HAVE ILLUMINATED.

3.3.7 TURN THE “FANS” SWITCH TO THE ON POSITION. THE EXHAUST FAN SHOULD RAMP UP TO SPEED WITHIN 20 SECONDS. THE AMU FAN SHOULD TURN ON IN 10 TO 20 SECONDS. ONCE ALL FANS HAVE BEEN PROVEN, THE LED IN THE “FANS” SWITCH WILL ILLUMINATE

VISUALLY CONFIRM THAT THE AMU FAN IS ROTATING IN THE DIRECTION OF THE STICKER THAT IS ATTACHED NEXT TO THE MOTOR

VISUALLY CONFIRM THAT THE EXHAUST FAN(S) IS ROTATING IN THE DIRECTION OF THE STICKER THAT IS ATTACHED NEXT TO THE MOTOR

STARTER CONTACTS SHOULD PULL IN AND HOLD WITHOUT CHATTERING (3 PHASE UNITS). IF THEY DO NOT OPERATE QUIETLY CHECK TO INSURE THAT THE PROPER VOLTAGE IS SUPPLIED TO THE UNIT.

3.3.8 IF HEAT IS DESIRED INSURE “SPRAY HEAT” SWITCH IS IN THE ON POSITION. **NOTE:** BURNER IS AUTOMATICALLY ENABLED DURING CURE CYCLE REGARDLESS OF THE POSTION OF THE “SPRAY HEAT” SWITCH. WITH THE “SPRAY HEAT” SWITCH ON, AND ALL SAFETY SWITCHES PROVEN, THE “INTERLOCKS CLOSED” LED ON THE VERIFLAME SHOULD ILLUMINATE.

3.3.9 PILOT - THE FLAME SAFEGUARD MONITORS THE PILOT FLAME THROUGH THE UV SCANNER. THE SCANNER DETECTS THE PRESENCE OF A FLAME AND IN TURN OPENS THE MAIN GAS SAFETY VALVE. IF NO FLAME IS PRESENT, THE UNIT WILL NOT ALLOW THE VALVE TO OPEN. THE SCANNER MUST HAVE AN UN-OBSTRUCTED VIEW OF THE BURNER AND MUST BE KEPT FREE OF SOOT AND CONDENSATION.

CLEANING AND MAINTENANCE OF BURNER:

PERIODIC MAINTENANCE WILL INSURE CONTINUED TROUBLE-FREE OPERATION OF YOUR BURNER. AT LEAST A YEARLY INSPECTION IS RECOMMENDED FOR HEATED INSTALLATIONS AND MORE OFTEN IF IN CONSTANT USE. YOUR OWN EXPERIENCE IS THE BEST GUIDE FOR DETERMINING THE FREQUENCY OF INSPECTION, BUT AS A MINIMUM THE FOLLOWING PROCEDURE SHOULD BE FOLLOWED:

- ❖ SHUT DOWN SYSTEM TOTALLY, DISCONNECTING OR LOCKING OUT POWER SUPPLY SO THERE CAN BE NO ACCIDENTAL START-UP DURING INSPECTION.
- ❖ INSPECT THE BURNERS CAREFULLY, INCLUDING UPSTREAM AND DOWNSTREAM SIDES OF MIXING PLATES AS WELL AS BURNER BODY FACE. ANY ACCUMULATION OF SCALE OR FOREIGN MATERIAL ON EITHER SIDE OF THE MIXING PLATES SHOULD BE REMOVED WITH A WIRE BRUSH. CHECK VISUALLY THAT NO HOLES IN THE MIXING PLATES ARE BLOCKED. IF ANY BURNER PORTS ARE PLUGGED (EVEN PARTIALLY) CLEAR THEM WITH A PIECE OF WIRE OR A DRILL BIT MATCHING THE DRILL SIZE FOR YOUR APPROPRIATE BURNER TYPE.

WARNING: DO NOT ENLARGE BURNER PORTS OR PERFORMANCE MAY BE DRASTICALLY AFFECTED.

IF ANY MIXING PLATES ARE LOOSE OR MISSING FASTENERS, TIGHTEN/REPLACE AS NECESSARY. ALWAYS USE ZINC PLATED OR STAINLESS FASTENERS.

- ❖ PUT SYSTEM BACK INTO OPERATION AND, IF POSSIBLE, VIEW FROM SIGHTGLASS SIDE WHILE CYCLING BURNER THROUGH FULL FIRING RANGE. THIS WILL GIVE A VISUAL CHECK FOR BLOCKED BURNER PORTS.
- ❖ OBSERVE FLAME PATTERN AND, IF NECESSARY, TAKE STEPS TO CORRECT VELOCITY AND/OR AIR DISTRIBUTION PROBLEMS (PROFILE PLATE ADJUSTMENT KNOB IS LOCATED ON THE BACK PLATE OF THE UNIT MOUNTED CONTROL CABINET. **NOTE:** CONTACT THE FACTORY BEFORE MAKE ANY ADJUSTMENTS)

3.3.10 IF THE CORRECT AIRFLOW IS RUNNING THROUGH THE HEATER AND THE HIGH TEMP LIMIT IS NOT TRIPPED THE INTERLOCKS CLOSED LIGHT ON THE FLAME SAFETY SHOULD COME ON. IF THE LIGHT BLINKS THE FLAME SAFETY IS IN PILOT TEST MODE AND THE RESET BUTTON SHOULD BE PRESSED. IF THE FLAME FAILURE LIGHT COMES ON THEN THE SPARK PLUG SHOULD BE CHECKED FOR SOOT OR THE GAS SUPPLY MAY BE OFF.

PILOT ADJUSTMENT SCREW IS IN THE PILOT SHUTOFF. THE PILOT SIZE WAS ADJUSTED AT THE FACTORY BEFORE THE UNIT SHIPPED, HOWEVER SOME FIELD ADJUSTMENT MAY BE NECESSARY. WHEN SETTING, ADJUST FOR A GOLF BALL SIZED PILOT FLAME, OR ABOUT 2.5" W.C. ON THE PILOT SOLENOID TEST PORT.

3.3.12 ADJUST THE TEMPERATURE CONTROLLER TO A HIGHER SET POINT TO START MAIN FLAME. CHECK FOR FLAME OVER ENTIRE BURNER LENGTH. FLAME SHOULD BE MOSTLY BLUE WITH SLIGHTLY ORANGE TIPS. IF THE FLAME IS VERY YELLOW OR ORANGE, THERE MAY BE EITHER TOO MUCH GAS PRESSURE, OR NOT ENOUGH AIR PRESSURE ACROSS THE BURNER.

3.3.13. ENSURE AMU CAN REACH THE TEMPERATURE SET POINT ON THE CONTROLLER. TYPICALLY THERE WILL BE ABOUT A 5 TO 7 DEGREE SWING PLUS OR MINUS THE SET POINT TEMP.

3.3.14 FLAME SUPERVISION CHECK:

THE FLAME SUPERVISION RELAY SHOULD BE CHECKED PERIODICALLY TO INSURE THAT THE CONTROLS ARE OPERATIONAL. WITH THE UNIT ON FULL OPERATION AND FIRING, CLOSE THE MAIN AND PILOT BALL VALVE AND THE BURNER SHOULD SHUT DOWN AND ISSUE A "FLAME FAIL" LED ON THE CONTROL PANEL.

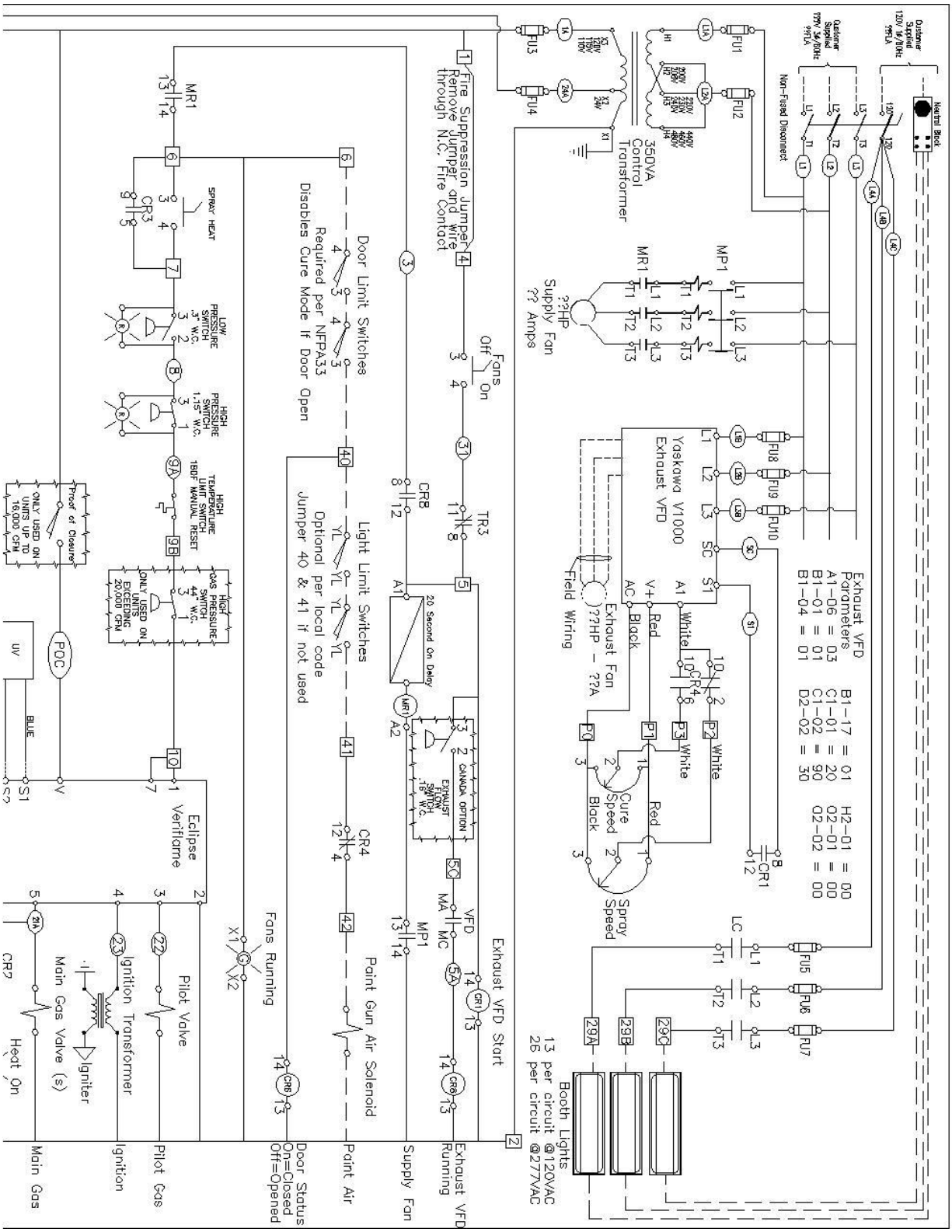
CHECK THE MAIN SAFETY VALVE FOR GAS SEAL BY PLACING A MANOMETER IN THE MANIFOLD BETWEEN THE SAFETY VALVE (A 1/8" PLUG IS PROVIDED FOR THIS). IF THERE IS A BUILD UP OF PRESSURE WITH THE UNIT LOCKED OUT AND THE MANUAL VALVE CLOSED, REPLACE THE SAFETY VALVE.

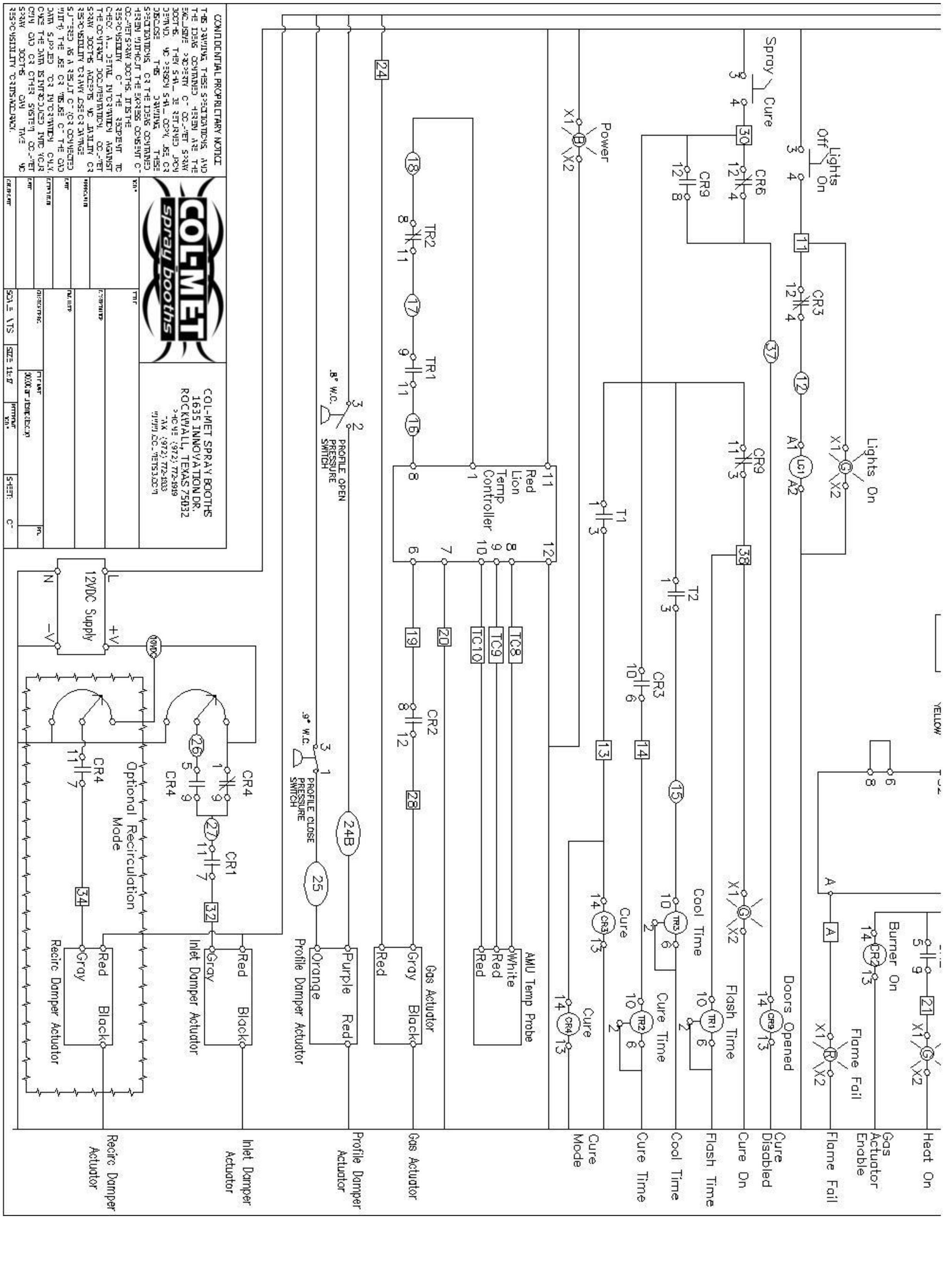
3.3.15. CFM

THE UNIT DEPENDS UPON AN ADEQUATE SUPPLY OF AIR FOR GOOD COMBUSTION AND OPERATION. CARE SHOULD BE TAKEN TO INSURE THAT PROPERLY SIZED INLET HOOD AND DUCTWORK ARE INSTALLED AND THAT THE UNIT IS DISCHARGING THE DESIGN CFM.

NOTE: RECIRCULATION IS NOT RECOMMENDED IN NON-INSULATED BUILDINGS WHERE OUTSIDE TEMPERATURES FALL BELOW 32 DEGREES FAHRENHEIT (0 DEGREES CELSIUS)

4.0 TYPICAL ELECTRICAL SCHEMATIC




COL-MET SPRAY BOOTHS
1635 INNOVATION DR.
ROCKWALL, TEXAS 75032
Red Lion Temp Controller
12VDC Supply
AMU Temp Probe
Gas Actuator
Profile Damper Actuator
Inlet Damper Actuator
Recirc Damper Actuator
Optional Recirculation Mode
PROFILE OPEN PRESSURE SWITCH
PROFILE CLOSE PRESSURE SWITCH
Power
Spray
Cure
Lights Off
Lights On
Doors Opened
Cool Time
Cure Time
Flash Time
Burner On
Flame Fail
Cure Mode
Cure On
Cure Disabled
Gas Actuator Enable
Heat On

5.0 BURNER UNIT

5.1 Burner Information

Data 160
10/01

AirHeat Burners

AH-MA Series

Version 2.10

Main Specifications

Parameter	Description
Input (Btu/hr./ft.)	1,200,000 maximum
Combustion Airstream Pressure Drop/Velocity	0.2" to 1.4" w.c.
Ignition	Direct spark ignition (6000VAC).
Pilot	Interruptible pilot for natural gas, propane or butane.
Pilot Capacities/Pressures	35,000 Btu/hr. with pressure drops of: Fuel — Standard Pressure — Low Pressure Natural Gas — 1.2" w.c. — 0.8" w.c. Propane — 0.5" w.c. — N/A Butane — 0.4" w.c. — N/A
Burner Bodies	Standard Aluminum Low Pressure Aluminum* Standard Cast Iron Corrosion Resistant, EN Plated Cast Iron Low Pressure Cast Iron*
Burner Section Sizes	• 150mm (6") straight section • 300mm (12") straight section • 300mm (12") straight section with back inlet • 300mm (12") straight section with pilot • 150mm (6") by 300mm (12") tee section • 150mm (6") by 300mm (12") tee section with pilot • 300mm (12") by 300mm (12") cross section
Pipe Threads	N.P.T. or B.S.P.
Maximum Upstream Air Temp.	450°F (232°C)
Maximum Downstream Air Temp.	850°F (454°C)
Maximum Temperature Rise	750°F (400°C)
Minimum Inlet Air Oxygen (O2)	18%
Flame Detection**	Flame rod or scanner.
Fuels	Natural gas, propane or butane.

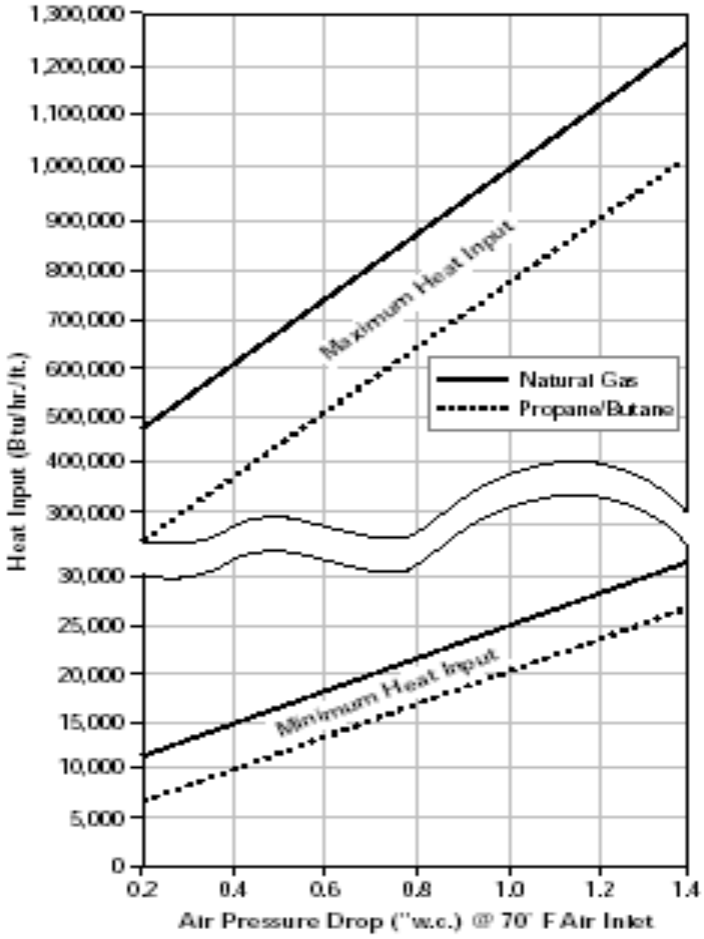
* For use with Natural Gas only.

** Burners over 5 lineal feet include flame supervision at the far end. If pilot ignition is being used, two flame supervision units are required; one for the pilot and one for the far end. If using direct spark on the main flame, only flame supervision at the far end is required providing ignition can be accomplished within 15 seconds. (Reference NFPA Requirement 5-9.2.2)

- Eclipse reserves the right to change the construction and/or configurations of our products at any time without being obliged to adjust earlier supplies accordingly.
- All information is based on laboratory testing. Different chamber size and air flow conditions may affect the data.
- All information is based on standard conditions (70°F at sea level). Contact Eclipse for performance data above ambient temperature.
- All inputs based on gross caloric values.

ECLIPSE

Operating Range & Duct Pressure Measurement



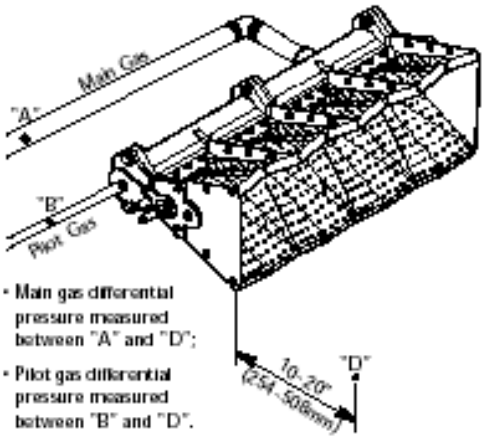
Inlet Air Temperature Correction

Air Press. Drop @ Air Temp. = Air Press. Drop from "Oper. Range" Chart x Correction Factor										
Air Inlet Temp. (°F)	0	30	70	150	200	250	300	350	400	450
Correction Factor	0.87	0.92	1.00	1.15	1.25	1.34	1.43	1.53	1.62	1.72

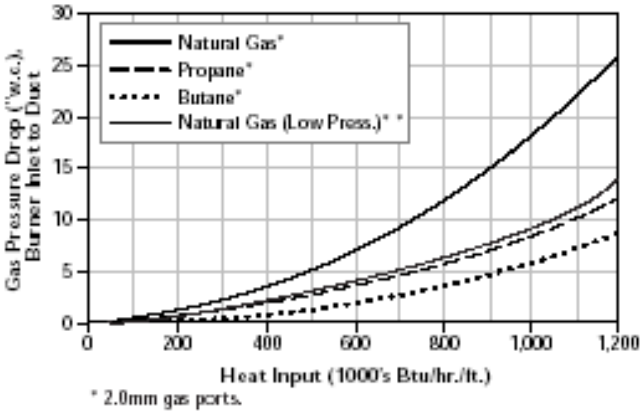
Air Velocity Calculation

$$\text{Air Velocity (fpm)} = 1096.2 \sqrt{\frac{\text{Air Pressure Drop ("w.c.)}}{\text{Air Density (lbs/cubic ft.)}}}$$

Differential Pressure Measurement & Burner Gas Pressure Drops

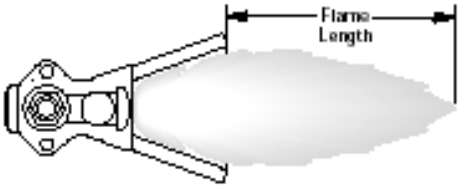


- Main gas differential pressure measured between "A" and "D";
- Pilot gas differential pressure measured between "B" and "D".

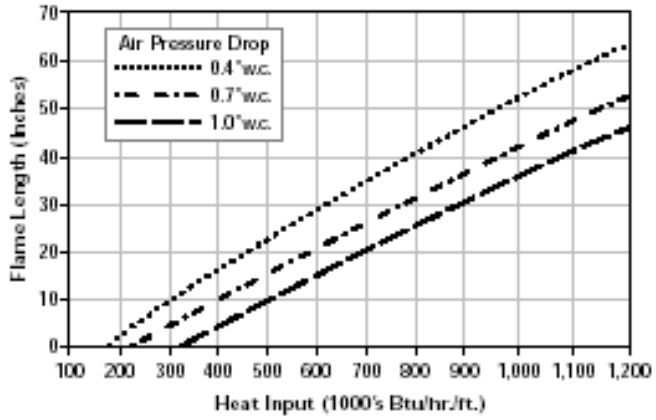


* 2.0mm gas ports.
* * 2.4mm gas ports

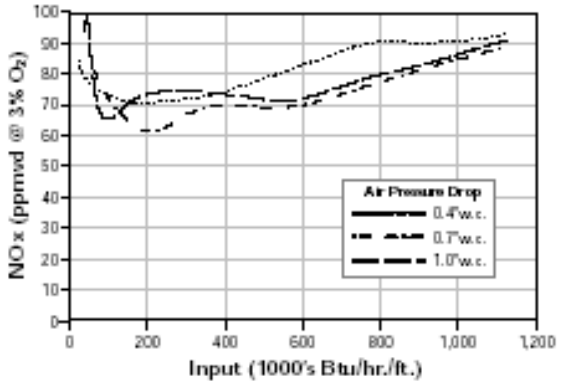
Flame Lengths

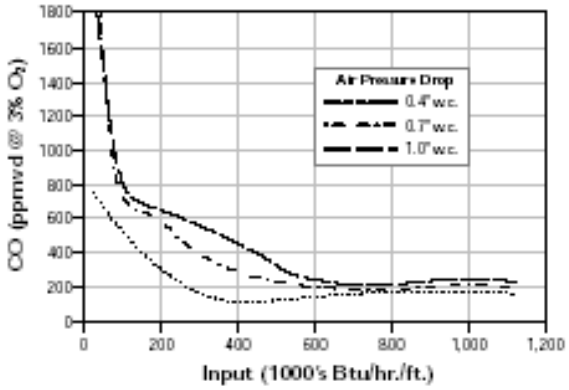


Note:
Flame length may vary slightly from these values depending on actual fuel, air handling system, duct configurations and profile plates uses.



Emissions Data





6.0 SEQUENCE OF OPERATION

6.1 Press the F button on the temp control. 1 or 2 will be displayed next to the temp set point. The red numbers are the actual temperature and the green numbers are the set point. 1 is the temperature set point for spray operations. 2 is the temperature for curing. Use the up/down arrows to change each set point. After both choices are made, be sure the controller is left in the #1 position.

6.2 Turn on the Fan and Light switches. The lights will come on immediately. The VFD will start ramping up the exhaust fan and the inlet damper will start to open. After 10 to 20 seconds the supply fan will start. As soon as the AMU fan starts the fan switch will light up. As the inlet damper continues to open the air flow will increase. After 90 seconds the inlet fan will be at full flow and the profile damper will be adjusting the burner pressure.

6.3 Adjust the Spray speed setting on the exhaust fan to balance the pressure in the booth by watching the magnehelic gauge on the control panel. The doors on the booth must be closed for the gauge to function properly. Typically during the spray mode, the gauge should be reading 0 or slightly to the right of 0. As the exhaust filters in the booth load up with overspray, adjustment may be necessary to maintain the desired booth pressure.

6.4 If heat is needed, turn on the Heat switch. This switch can be turned on at any time. The burner will light automatically once all safety switches have been proven. The Spray Heat switch should illuminate within 60 seconds. If it does not illuminate then the main gas valve has not opened and here could be a safety fault. See the troubleshooting guide to determine the fault. If the “Flame Fail” LED illuminates, turn the “Spray Heat” switch off for 5 seconds, then back on. This will reset the flame controller and re attempt ignition. If this is the first attempt at ignition (new start-up) it may take several tries to get any air out of the gas lines. If the “Flame Fail” LED illuminates ten times in a row, see the troubleshooting section to determine the problem.

6.5 Once the burner ignites, the “Spray Heat” switch will illuminate. The temperature will come up to the #1 temp setting on the Temp controller. Now you can paint your product.

6.6 When you are ready to cure the paint, turn the last switch from Spray to Cure. The Flash timer will come on. You will see a flashing green light on the timer that will flash faster as it nears its set point time. You can set this time as long or as short as you wish, from a few seconds to several hours. This will also give your workers time to exit the booth. When the Flash timer times out the booth lights will turn off. If you did not choose to use heat during painting the burner will ignite at this time. The Temp controller will switch to the #2 temp set point and the burner will begin to modulate the flow of gas in order to maintain the desired temp set point.. At the same time the inlet damper will close to the cure position to reduce the air flow in the booth. After giving the AMU about 2 minutes to balance out at the new air flow, adjust the Cure speed setting to rebalance the pressure in the booth while curing (as indicated by the Magnehelic gauge on the control panel) During cure, the booth should run slightly positive to ensure the heat is not immediately exhausted out of the booth.

6.7 Set the Cure timer to the required cure time your product requires. Set the Cool timer to the amount of time you wish for the part to cool down after curing.

6.8 When the Cure timer has finished the temp will go back to set point #1 and stay there until the Cool timer times out. At this point the burner and fans will shut down and the inlet damper will close. The Cure light will stay on.

6.9 Turn the “Spray Cure” switch back to Spray to start the cycle over. The booth lights will come back on and the booth fans will start.

6.10 The Fan and Light switches can be turned off at any time. The burner, lights, and fans will shut down and the inlet damper will close.

6.11 Photo of typical Remote Control Panel (Cure option shown)

7.0 TROUBLESHOOTING

7.1 THE AMU FAN MUST BE SPINNING IN THE CORRECT DIRECTION FOR THE SYSTEM TO FUNCTION PROPERLY. ALWAYS VISUALLY INSPECT THE FAN TO ENSURE IT IS ROTATING THE CORRECT DIRECTION (AS INDICATED BY THE ROTATION STICKER)

7.2 IF INLET DAMPER FAILS TO OPEN WHEN UNIT IS TURNED ON, CHECK THE FOLLOWING:

- ❖ MAIN DISCONNECT SHOULD BE ON.
- ❖ FUSES - MAIN CONTROL PANEL.
- ❖ ON OFF SWITCH AT THE REMOTE PANEL MUST BE IN THE ON POSITION.
- ❖ CONTROL RELAY NUMBER 1 MUST BE ON. (CHECK VOLTAGE AT COIL)
- ❖ 24VAC TO RED WIRE OF INLET DAMPER ACTUATOR
- ❖ 10VDC TO GREY WIRE OF INLET DAMPER ACTUATOR
- ❖ SET SCREW ON ACTUATOR TIGHT
- ❖ ACTUATOR SHOULD BE ALLTHE WAY CLOCKWISE WHEN 10VDC IS ON GREY WIRE AND 24VAC IS ON RED WIRE.

7.3 IF INLET DAMPER OPENS BUT BLOWER FAILS TO OPERATE, CHECK THE FOLLOWING CONTROLS:

- ❖ MOTOR PROTECTER (MP1) – BLACK HANDLE SHOULD BE AT 12 OCLOCK POSTION.
- ❖ PROPER VOLTAGE ON THE TOP OF THE MOTOR PROTECTOR AS LISTED ON THE MANUFACTUING TAG.

7.4 DAMPER OPEN, AMU BLOWER IS RUNNING, BUT PILOT WILL NOT LIGHT AND NO "FLAME FAIL" ILLUMINATED ON REMOTE CONTROL PANEL CHECK THE FOLLOWING:

- ❖ AMU FAN ROTATING CORRECT DIRECTION
- ❖ "SPRAY HEAT ON/OFF" SWITCH IN THE ON POSITION.
- ❖ 120VAC PRESENT ON TERMINAL 7 IN AMU CONTROL PANEL – IF NOT, CHECK FIELD WIRING BETWEEN AMU AND REMOTE
- ❖ 120VAC PRESENT ON WIRE 8 INSIDE "LOW AIR PRESSURE SWITCH" – IF NOT, CHECK AMU PRE FILTERS, AMU FAN ROTATION, AND DIFFUSER AT INLET OF BOOTH (THE BLOWER IS NOT MOVING ENOUGH AIR DUE TO EXCESSIVE STATIC LOAD.)
- ❖ 120VAC PRESENT ON WIRE 9 INSIDE "HIGH AIR PRESSURE SWITCH" – IF NOT, CONFIRM AUTOMATIC PROFILE DAMER IS OPENING.
- ❖ 120VAC PRESENT ON TERMINAL 9 OF TERMINAL STRIP – IF NOT, CHECK HIGH TEMPERTAURE LIMIT
- ❖ GREEN "INTERLOCKS CLOSED" LED ILLUMINATED ON VERIFLAME CONTROLLER – LED SHOULD NOT BE FLASHING, IF IT IS THEN BLACK RESET BUTTON ON THE CONTROLLER NEEDS TO BE IN THE OUT POSITION.

7.5 DAMPERS ARE OPEN, BLOWER IS RUNNING, "FLAME FAIL" ILLUMINATED ON REMOTE CONTROL PANEL; CHECK THE FOLLOWING:

- ❖ USE SIGHT GLASS ON OPPOSITE SIDE OF AMU TO VERIFY THAT THE IGNITER IS ENERGIZING DURING THE 10 SECOND TRIAL FOR IGNITION. (MAY REQUIRE AN ASSISTANT TO TURN THE “SPRAY HEAT SWITCH” ON AND OFF TO RESET THE FLAME CONTROLLER)
- ❖ IF SEEING SPARK BUT NO PILOT, ENSURE GAS BALL VALVES ARE OPEN, AND THERE IS AT LEAST 2” W.C. OF GAS PRESSURE AT THE TEST PORT ON THE SIDE OF THE PILOT VALVE.
- ❖ IF SEEING SPARK AND PILOT, BUT UNIT STILL SHOWS FLAIM FAILURE AFTER 10 SECOND TRIAL FOR IGNITION, CLEAN AND/OR REPLACE UV SCANNER.

7.6 DAMPERS ARE OPEN, BLOWER IS OPERATING, PILOT IS ON, MAIN FLAME LOW FIRE IS ON, BUT UNIT WILL NOT MODULATE - CHECK THE FOLLOWING:

- ❖ ENSURE INCOMING GAS PRESSURE TO VALVE TRAIN IS AT LEAST 14” W.C.
- ❖ ENSURE BALL VALVE DOWN STREAM OF ELECTRIC SAFETY SHUT OFF VALVE IS IN THE ON POSITION.
- ❖ TEMP CONTROLLER IS SET AT LEAST 20 DEGREES ABOVE THE AMBIENT TEMPERATURE
- ❖ TEMP CONTROLLER IS NOT FLASHING “OPEN” – IF FLASHING “OPEN”, CHECK WIRES TC8, TC9 AND TC10 AT ALL CONNECTION POINTS TO ENSURE THERE ARE NO LOOSE WIRES, OR CROSSED CONNECTIONS.
- ❖ PRESS CIRCLE BUTTON ON TEMP CONTROLLER, 40% PW SHOULD APPEAR IN GREEN. USE VOLT METER TO MEASURE VOLTAGE ON TERMINAL 19 AND 20 (20 MUST BE GROUND, 19 MUST BE +) DC VOLTAGE SHOULD BE AROUND 4.0V
- ❖ CONFIRM 4.0VDC IS PRESENT BETWEEN 19 (+) AND 20 (-) IN THE AMU PANEL – IF NOT, WIRES BETWEEN AMU AND REMOTE COULD BE REVERSED OR LOOSE.
- ❖ CONFIRM 4.0VDC IS PRESENT BETWEEN 20 (-) AND 28 (+) – IF NOT, ENSURE CR2 IS ENERGIZED.
- ❖ LINKAGE ON BUTTERFLY VALVE MAY BE JAMMED OR SLIPPING.
- ❖ ENSURE VOLTAGE AT THE GAS ACTUATOR (BLACK WIRE = GROUND, RED WIRE = 24VAC, GREY WIRE = 4.0VDC)
- ❖ CONFIRM GAS PRESSURE AT ELECTRIC SAFETY SHUT OFF VALVE TEST PORT IS ABOUT 7.0” W.C.

7.7 UNIT IS OVERSHOOTING OR UNDERSHOOTING THE TEMP SET POINT:

- ❖ PERFORM AUTO-TUNE ON TEMP CONTROLLER – SEE INCLUDED CD MANUAL FOR DETAILED INSTRUCTIONS.

7.8 INTERMITTENT START:

- ❖ LOOSE WIRING - CHECK TO INSURE ALL WIRING CONNECTIONS ARE SECURE.
- ❖ UNSTABLE GAS OR ELECTRICAL SUPPLY
- ❖ FAULTY OR DIRTY UV SCANNER (PROPER FLAME SHOULD BE APPROXIMATELY 12-18" INCHES ON HIGH FIRE.)

7.8 LONG LAZY FLAME:

- ❖ PROPER FLAME LENGTH ON HIGH FIRE SHOULD BE 12"-18" LONG.
- ❖ HIGH GAS PRESSURE - ADJUST REGULATOR MANIFOLD PRESSURE SHOULD NOT EXCEED RATING PLATE.(7” W.C. NATURAL GAS OR 3.5" W.C. PROPANE MAXIMUM.)
- ❖ INCORRECT AIR PRESSURE ACROSS THE BURNER – CONFIRM PRESSURE ACROSS THE BURNER IS ABOUT .75” W.C.

7.9 GAS FAILS TO SHUT OFF:

- ❖ DIRT ON VALVE SEAT- CLEAN
- ❖ DEFECTIVE MAIN SAFETY VALVE - REPLACE
- ❖ INCORRECT FIELD WIRING CONNECTION – CONFIRM NO VOLTAGE IS FEEDING TO THE MAIN GAS VALVE WHEN THE POWER IS ON, BUT THE "SPRAY HEAT" SWITCH IS OFF.

CHECK OVER AND FULLY TEST ALL FIELD WIRING RECONNECTIONS BETWEEN SECTIONAL UNIT SPLITS AND REMOTE PANELS.

8.0 OPERATING PRINCIPLES OF THE RAW GAS BURNER

THE RAW GAS BURNER IS DESIGNED TO OPERATE IN A DUCT OF FLOWING FRESH AIR. FUEL GAS IS FED DIRECTLY TO THE BURNERS; KINETIC ENERGY OF THE AIR STREAM FURNISHES COMBUSTION AIR. THE BURNER MUST BE INSTALLED TO FIRE WITH AND PARALLEL TO THE AIRFLOW. BY VIRTUE OF VELOCITY IMPACT AND SUCTION GENERATED BY THE DIVERGING SHAPE OF THE COMBUSTION BAFFLES, AIR IS INDUCED THROUGH THE AIRPORTS INTO THE COMBUSTION ZONE. THE AIR SUPPLY IS CONSTANT THROUGH ONLY THAT WHICH MIXES WITH THE GAS FLOWING FROM THE BURNER PORTS, TAKES PART IN COMBUSTION.

WHEN A VERY SMALL QUANTITY OF GAS IS ADMITTED TO THE BURNER, SUFFICIENT MIXING TAKES PLACE IN THE LOW FIRE SLOT WITHIN THE BURNER, CASTING AND COMBUSTION TAKES PLACE IN THIS ZONE. SINCE THE LOW FIRE IS CONTAINED WITHIN THE BURNER CASTING IT IS EFFECTIVELY SHIELDED FROM FIRE DISRUPTING UNCONTROLLED AIR ENTRY.

AS THE GAS SUPPLY IS INCREASED THE FLAME PROGRESSES INTO THE INTERMEDIATE FIRE ZONE WHERE AN ADDITIONAL SUPPLY OF AIR IS AVAILABLE. AT HIGHER OR FULL CAPACITY, MIXING OCCURS AT THE LARGER AIRPORTS OF THE HIGH FIRE ZONE AUGMENTED BY AIR SPILLING OVER THE END OF THE BAFFLES.

WITH A REDUCTION OF GAS SUPPLY THE REVERSE SEQUENCE TAKES PLACE – THE FLAME RECEDES TO A LOCATION OF LESSER AIR SUPPLY UNTIL THE LOW FIRE ZONE IS REACHED. THE SYSTEM ABOVE IS SUITABLE FOR A TURN DOWN RANGE OF APPROXIMATELY 30 TO 1.

WITH SUCTION GENERATED BY THE BLOWER THERE IS A PRESSURE IN THE GAS MANIFOLD OF LESS THAN ZERO AT LOW FIRE. THEREFORE, WHEN CHECKING THE MANIFOLD PRESSURE YOU WILL FIND THAT THE PRESSURE WILL RANGE FROM APPROXIMATELY 4.5" W.C. TO LESS THAN ZERO, WHEN THE UNIT IS MODULATING FROM HIGH TO LOW FIRE.

9.0 PROPER COMBUSTION FOR THE DIRECT FIRED BURNER

FOLLOWING ARE INDICATIONS OF PROPER COMBUSTION:

1. BLUEISH FLAME WITH ORANGE TIPS WHEN BURNING NATURAL GAS.
2. STABLE EVEN FLAME NOT PULSATING OR RADICAL PATTERN.
3. ON HIGH FIRE THE FLAME SHOULD RANGE 12-18" IN LENGTH.
4. ON LOW FIRE FLAME SHOULD RUN ALL THE WAY ACROSS THE BURNER AND BE 1-2 INCHES LONG.
5. FLAME SHOULD EMIT LESS THAN 5PPM CO WHEN CHECKED WITH A COMBUSTION ANALYZER
6. FLAME SHOULD NOT PRODUCE ANY SUBSTANTIAL ODOR

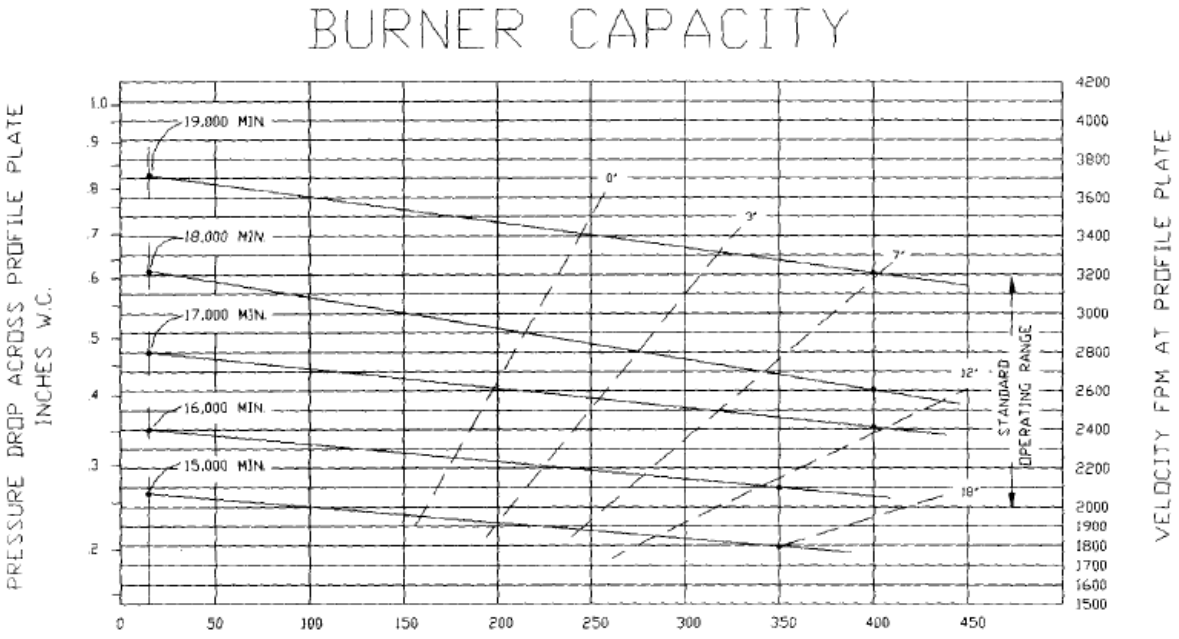
INSTRUMENTS REQUIRED:
PRESSURE DIFFERENTIAL GAUGE (MANOMETER OR MAGNEHELIC)
DUCT VELOMETER (ALNOR SERIES 6000)
THERMOMETER WITH A SCALE -30+ 200F.

REFER TO THE FOLLOWING EXAMPLES TO DETERMINE AIRFLOW AND BURNER CAPACITY FOR INSTALLATION.

9.1 EXAMPLE 1
TO DETERMINE THE AMOUNT OF AIR FLOWING THROUGH THE UNIT, MEASURE DISCHARGE AIR VELOCITY AND MEASURE DUCT AREA. (SQUARE FOOTAGE OF DUCT AREA MULTIPLIED BY THE AIR VELOCITY = CFM OF AIR BEING DELIVERED)

GAS CONSUMPTION PER FOOT OF BURNER =308 FT 3 REFER TO THE BURNER CAPACITY CHART, READING LEFT TO RIGHT. LOCATE THE VALUE 308 THEN FOLLOW THE VERTICAL LINE TO THE INTERSECTION WITH THE HORIZONTAL LINE CORRESPONDING TO .38" WC. PROCEED UP THE CURVE (OR DRAW A NEW SLOPE PARALLEL TO EXISTING CURVES) AND READ 0.5" WC. READ ACROSS THE VELOCITY AXIS AND THE VALUE 2900 FPM.

CFM THROUGH THE UNIT =2900 x 2.42=7,018



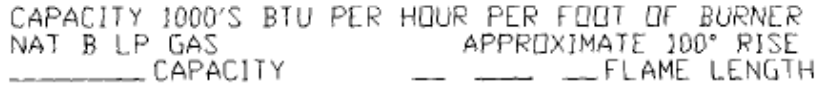


FIGURE 2 CAPACITY & FLAME LENGTH WITH VARIOUS AIR FLOWS

TABLE II

BTU HR. REQUIRED FOR EACH 1,000 C.F.M. OF FAN RATING (AT 70° F.)

DESIRED DELIVERY TEMPERATURE	LOWEST EXPECTED OUTSIDE TEMPERATURE (DEGREES F.)										
	-12º	-15º	-10º	-5º	0º	5º	10º	15º	20º	25º	30º
70º	99,000	94,000	88,000	82,000	77,000	71,000	66,000	61,000	55,000	49,000	44,000
75º	104,000	98,000	93,000	87,000	82,000	76,000	71,000	66,000	60,000	54,000	49,000
80º	108,00	103,00	98,00	92,00	87,00	81,00	76,000	70,000	65,000	59,000	54,000
85º	113,000	107,000	102,000	96,000	91,000	85,000	80,000	75,000	69,000	64,000	59,000
90º	117,000	111,000	106,000	101,000	96,000	90,000	85,000	80,000	74,000	69,000	64,000
95º	121,000	116,000	111,000	105,000	100,000	94,000	89,000	84,000	79,000	73,000	68,000
100º	112,000	120,000	115,000	109,000	104,000	99,000	94,000	89,000	83,000	79,000	72,000

TEMPERATURE RISE: (AMU's)

The equation for calculating the temperature rise capability of a burner can be determined by the following formula.

BTUs of burner ÷ CFM of re-circulated air ÷ 1.08 = The temperature rise capable of the burner system

1.08 is the density of gas & its specific gravity.
Temperature rise is the difference in temperature from that desired and the ambient temperature.

10.0 RECOMMENDED MONTHLY MAINTENANCE

1.) Check for loose connections in the wiring.
2.) Check the voltage at the unit while it is in operation.
3.) Check motor amperage draws against their rating plate values
4.) Inspect all contactors to ensure that they are clean and making good contact.
5.) Check all fittings, valves and lines for leaks.
6.) Check the burner; clean and adjust if necessary.
7.) Check the flame sensor; clean if necessary.
8.) Check the fuel supply pressure at the unit.
9.) Check the manifold pressure.
10.) Check all dampers, linkages and damper actuators; adjust and tighten as required.
11.) Clean or replace filters if necessary. Replace only with equivalent of supplied filter.
12.) Check operation of all safety controls

11.0 RECOMMENDED YEARLY MAINTENANCE

1.) Perform the monthly maintenance recommended.
2.) Inspect blower wheels and housings; clean if necessary.
3.) Inspect all set screws on blower wheels to ensure that they are secured to their respective shafts.
4.) Check ignition spark and adjust gap if necessary.
5.) Inspect and clean ignition electrodes.
6.) Check flame supervision relay.
7.) Inspect all operating and safety controls; clean and replace if necessary.
8.) Clean the burner.

NOTE: Refer to manufacturer literature provided for maintenance requirements of optional equipment.

12.0 REPLACEMENT PARTS

To order replacement parts, please provide the following information when contacting your local representative:

- Unit model number (Located on metal plate attached to AMU control panel)
- Unit serial number (Located on metal plate attached to AMU control panel)
- Address for replacement part delivery
- Urgency (Overnight shipping may be required)
- Company representative for us to contact should questions arise

Recommended Spare Parts for Units:
EH812/1216
EHC812/1216
EHCR812/1216

MFG Part Number:	Col-Met Part Number:	Description:
VF560522AA	BRN-210	Eclipse Veriflame(Purge Model)
49600-91	BRN-215	Eclipse UV Scanner
46012-2	BRN-360	Dungs Air Pressure Switch
GDE164.1P	BRN-365	Seimens Inlet Damper/Gas modulation Actuator
GDE136.1P	BRN-375	Seimens Profile Damper Actuator
13047-1	BRN-SPK	Burner Igniter
OEMNH000	ELE-RL-TC	Red Lion Temperature Controller

Recommended Spare Parts for Units:
EH2026/2734/3540
EHC2026/2734/3540
EHCR2026/2734/3540

MFG Part Number:	Col-Met Part Number:	Description:
VF560522AA	BRN-210	Eclipse Veriflame(Purge Model)
49600-91	BRN-215	Eclipse UV Scanner
46012-2	BRN-360	Dungs Air Pressure Switch
GDE164.1P	BRN-365	Seimens Gas modulation Actuator
GDE164.1U	BRN-370	Seimens Inlet Damper
GDE136.1U	BRN-380	Seimens Profile Damper Actuator
13047-1	BRN-SPK	Burner Igniter
OEMNH000	ELE-RL-TC	Red Lion Temperature Controller

AMU Fan Belts:
EH2026/2734/3540 = qty2 – B62
EHC2026/2734/3540 = qty2 – 5V710
EHCR2026/2734/3540 = qty3 – 5V740

1635 Innovation Drive Rockwall, Texas 75032
www.colmetsb.com 1-888-452-6684 972-772-1919 Fax 972-772-1833

WARRANTY

DIRECT FIRED SERIES WARRANTY

THE WARRANTY ON THE COL-MET SPRAY BOOTHS MANUFACTURING DIRECT GAS FIRED MAKE UP AIR UNITS IS ONE (1) YEAR FROM INSTALLATION DATE **OR** 13 MONTHS FROM DATE OF SHIPMENT FROM OUR FACTORY.

OUR WARRANTY APPLIES FOR ORIGINAL SHIPMENT ON ALL PARTS OR COMPONENTS FABRICATED BY OR INSTALLED BY US WITH THE EXCEPTION OF AIR FILTERS, UV SCANNERS, IGNITORS, AND BLOWER BELTS.

WITHIN THE ONE YEAR WARRANTY, REPLACEMENT PARTS WILL BE SHIPPED COLLECT AND CHARGED TO THE CUSTOMER'S ACCOUNT WITH CREDIT BEING ISSUED AFTER RECEIPT OF AND EXAMINATION OF THE RETURNED PARTS: FREIGHT PREPAID TO THE FACTORY.

THIS WARRANTY DOES NOT INCLUDE FREIGHT, LABOR, OR SALES TAXES THAT MAY BE INCURRED BY THE PURCHASERS AND IS SUBJECT TO THE FOLLOWING CONDITIONS:

1.) THE UNIT SHALL BE INSTALLED BY A QUALIFIED HEATING CONTRACTOR IN ACCORDANCE WITH THE PROVISIONS OF THE SERVICE MANUAL.
2.) THE UNIT SHALL HAVE BEEN INSTALLED IN ACCORDANCE WITH ALL STATE AND LOCAL CODES.
3.) THE UNIT SHALL HAVE BEEN SUBJECT TO ONLY NORMAL USE IN SERVICE AND SHALL HAVE NOT BEEN MISUSED, NEGLECTED, ALTERED OR OTHERWISE DAMAGED.
4.) THE UNIT SHALL HAVE BEEN OPERATED WITHIN ITS RATED CAPACITY AND WITH THE PRESCRIBED FUEL AND VOLTAGE.
5.) ALL AUTOMATIC CONTROLS SHALL HAVE BEEN OPERATIVE AT ALL TIMES.
6.) THE UNIT HAS NOT BEEN ALLOWED TO EXCEED ITS PROPER TEMPERATURE LIMITS DUE TO CONTROL MALFUNCTION OR INADEQUATE AIR CIRCULATION.
7.) THERE IS NO EVIDENCE OF TAMPERING OR DELIBERATE DESTRUCTION.

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