RTT Engineered Solutions
2975 Discovery Blvd.
Rockwall, Texas 75032

AMU & Booth Start-Up Guide

V2.2

Before arriving at job site

a1. _____ Ensure you have the required tools

a1a. _____ Voltmeter

a1b. _____ "True RMS" Ammeter

a1c. _____ 0" to 10" Manometer Gauge (Ex: Dwyer 477AV-0) used to measure profile pressure. Tubing fittings in the AMU are ¼" hose barb.

a1d. _____ 0" to 200" Manometer Gauge (Ex: Dwyer 477AV-3) used to measure gas pressure. Test port fittings in the AMU are ¼" female pipe threads. (hose barb not included)

a1e. _____ Basic hand tools including but not limited to: screwdrivers, wrenches, plyers, pipe wrench, wire strippers, technicians screw drivers, allen wrenches, drill and bits/drivers, electrical tape, Teflon tape, wire nuts, 1/8" hose barbs, ¼" hose barbs, etc.

a1f. _____ Printed copy of this document so that items can be checked off, voltages/pressure info can be filled in, and operator training signatures can be obtained.

a2. _____ Request photos of the incoming power wires to the disconnect from the customer to ensure the unit has power. If photos are not available, get signature from customer stating that the power has been connected and is ready for start-up.

a3. _____ Request photos of field wiring connections:

a3a. _____ exhaust fans

a3b. _____ light fixtures

a3c. _____ air solenoid

a3d. _____ AMU to Remote

a3e. _____ Inlet damper actuator

a3f. _____ temperature probe

If photos are not available, get signature from customer stating that the connections have been completed and unit is ready for start-up.

a4. _____ Request photo of gas line connected to unit preferably with gauge showing the gas pressure. If photo is not available, get signature from customer stating that gas is connected and is at the proper pressure and unit is ready for start-up.

a5. _____ Request photo of the tubing in the remote connected from the pressure sensor and the booth wall. If photo is not available, get signature from customer stating that the tubing is connected and ran to the booth and that the unit is ready for start-up.

a6. _____ Using the serial number or job number of the AMU, contact RTT for a digital copy of the operation & maintenance manual. Phone: 972.772.1919 Email: techsupport@rttsolutions.com

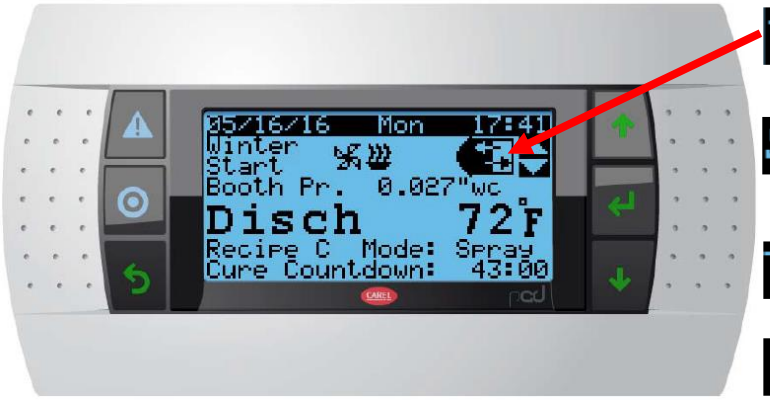
a7. _____ Using steps **a9** through **a16** below, familiarize yourself with the operation of the Corel controller. You will need to know how to login, adjust booth pressure, adjust cure recipes, etc.

a8. _____ Using the operation manual, familiarize yourself with the sequence of operation of the unit.

a9. _____ The carel operator display is located in the remote panel. Note the functions of the buttons below.

a10. _____ This controller is where various status and values are read.

a11. _____ To navigate through the controller, use the up down and enter keys to make selections.



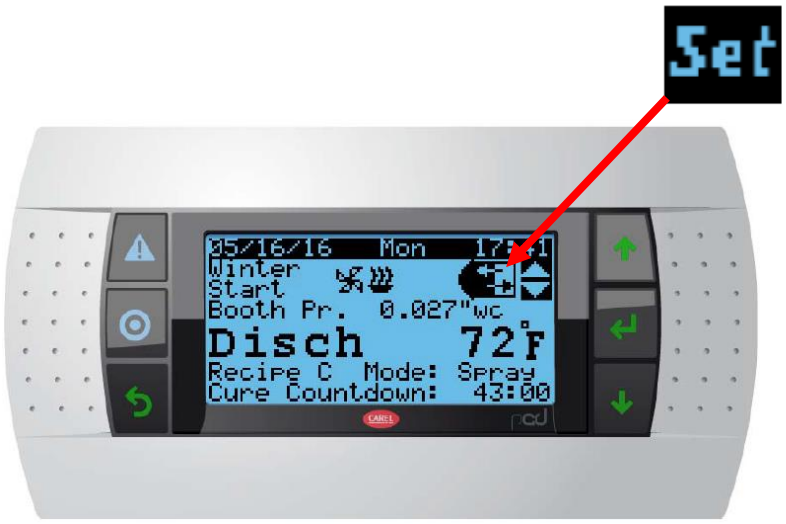
Input/Output Screens: display the current digital and analog input and output signals processed by the digital controller.

Mode/Setpoints Screens: Allow personnel logged in with the User or Technician password to view and change unit operation modes and setpoints. The screens will be viewable only without entering a password.

Technician Screens: Allow personnel logged in with the Technician password to view and change advanced unit modes and set points. The settings will be viewable only by users with the User password or those who are not logged in.

Information Screens: Display information about the AMU and digital controller.

a12. _____ To enter the most used settings (booth pressure, temperature, recipe settings), use the up/down button so that the upper right icon changes to Set – then press enter.



Mode/Set points Screens:
Select Mode / Set points icon from the Quick Menu. The first "Active Settings" screen does not require a password to allow operator to make quick changes. Additional mode/set point screens require "OPERATOR" or higher level in order to change settings. The "OPERATOR" password is 2050.

Navigate to the desired setting using the up/down/enter keys.

After desired settings are entered, ensure the "Save Changes" is Yes

Screen 1

Active Settings	
Summer/Winter	WINTER
Run Recipe	C
Spray	72°F
Flash	90°F / 180s
Cure 1	144°F / 13m
Cure 2	126°F / 23m
Cool	63°F / 240s

Active Settings Menu Details
Summer or Winter Mode Selection
Run Recipe (Select Active Recipe)
Spray Mode Disch Temp Set (Read-Only)
Flash Mode Disch Temp/Time Set (Read-Only)
Cure 1 Mode Disch Temp/Time Set (Read-Only)
Cure 2 Mode Disch Temp/Time Set (Read-Only)
Cool Mode Disch Temp/Time Set (Read-Only)

Screen 2

Recipe Stpts. 1 of 2	
Show Recipe	C
Spray Temp Set	72°F
Flash Temp Set	90°F
Flash Seconds	180s
Cure 1 Temp Set	144°F
Cure 1 Minutes	13m
Save Changes:	No

Recipe Setpoints Menu Details
Select Recipe Setpoints to Display
Spray Mode Discharge Temp Setpoint
Flash Mode Discharge Temp Setpoint
Flash Mode Time Setpoint
Cure 1 Mode Discharge Temp Setpoint
Cure 1 Mode Time Setpoint
Save Changes (Yes or No)

Screen 3

Recipe Stpts. 2 of 2	
Showing Recipe	C
Cure 2 Temp Set	126°F
Cure 2 Minutes	23m
Cool Temp Set	126°F
Cool Seconds	240s
Save Changes:	No

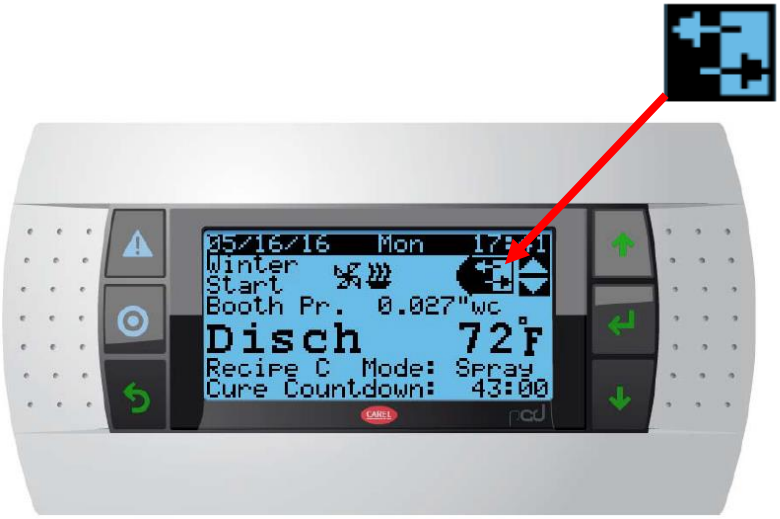
Recipe Setpoints Menu Details
Showing Recipe on Display
Cure 2 Mode Discharge Temp Setpoint
Cure 2 Mode Time Setpoint
Cool Mode Discharge Temp Setpoint
Cool Mode Time Setpoint
Save Changes (Yes or No)

Screen 4

Other Setpoints	
OA Temp Included:	NO
OA Ht Enbl Set	65°F
Booth Pr Set	0.025"wc

Other Setpoints Menu Details
OA Temp Sensor Included (Read Only)
OA Heat Enable Setpoint (If Included)
Booth Relative Pressure Setpoint

a13. _____ To assist with troubleshooting, use the Input Output Screens. These values will let you know the status of various digital and analog inputs/outputs to the Carel controller.



Input Output Screens:

Access these screens from the Input/Output icon on the Quick Menu. These values represent analog and digital inputs to the controller or internal calculated values based upon direct inputs. Use up / down arrow keys to switch between screens. These screens can be useful when troubleshooting – for example, if the digital output telling the fan to run is on, but the digital input from the VFD is not on, then it can be concluded that the VFD may be faulted.

Screen 1

ANALOG INPUTS	
1: Disch Temp	71°F
Eff Disch Set	72.0°F
OA Temp Included:	NO
2: Opt. OA Temp	###°F
3: Booth Pr.	0.027"wc

Analog Input Menu Details
Discharge Temperature
Effective Discharge Temp. Setpoint
Outdoor Temp Included (Read-Only, Set @ Tech)
Optional Outdoor Air Temp
Booth Relative Pressure

Screen 2

DIGITAL INPUTS 1	
D1: Start Relay:	ON
D2: Cure Enable:	OFF
U4: RA Dmpr Closed:	ON
U5: Cure Min OA:	ON
U6: Airflow:	ON
U7: Burner:	ON
U8: Mtr Ctrl Enbl:	ON

Digital Input Menu Details
Start Relay Status
Cure Enable Status
Return Air Damper Blade Switch Status
Cure Minimum OA Proving Switch Status
Supply Blower Status
Burner Status
Supply Motor Controller Enabled

Screen 3

DIGITAL INPUTS 2	
U9: Flame Safety:	OK

Digital Input Menu Details
Flame Safeguard Status

Screen 4

ANALOG OUTPUTS	
Y1: VFD Spd Cmnd	89%
Y2: Gas Valve	42%

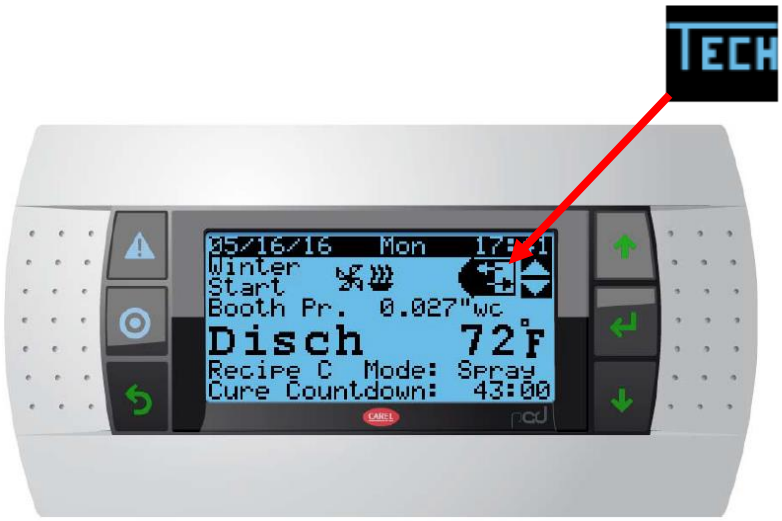
Analog Output Menu Details
Exhaust VFD Speed Control Loop Cmnd. Pct.
Heating Control Loop Command Percentage

Screen 5

DIGITAL OUTPUTS	
D1: Unit Enable	OFF
D2: General Alarm	OFF
D3: Burner Enable	OFF
D4: Full Cure	OFF
D5: Min OA Enable	OFF
D6: Shtdwn Alarm	OK

Digital Output Menu Details
Fan Enable Output Status
General Alarm Status
Heat Enable Output Status
Full Cure Cycle Output Status
Minimum OA Enable Output Status
Unit Shutdown Alarm Contact Output Status

a14. _____ To access advanced settings that may need to be adjusted in special circumstances during the start-up procedure, use the Tech screens. Contact RTT at 972.772.1919 for the tech passcode.



Technician Setup Screens:
It is not common to adjust settings within the tech menu. These settings are intended to be adjusted by technicians during special circumstances.

Screen 1

TECHNICIAN 1	
Lo Tmp Sfty Set	39°F
Lo Tmp Sfty Time	180s
Aux Hi Tmp Limit	240°F
Heat Gain	3
Heat Integ Time	45s
Disch. Temp Adj.	0.0°F
OA Temp Adjust	0.0°F

Technician 1 (Up/Down key for Tech #2-4)
Low Temperature Safety Temp Setpoint
Low Temperature Safety Timer Setpoint
Auxiliary High Temperature Limit Setpoint
Heating Loop Proportional Band Gain
Heating Loop Integral Time
Discharge Temp. Sensor Input Adjustment
Outside Air Temp. Sensor Input Adjustment

Screen 2

TECHNICIAN 2	
Exh VFD Start Ref	90%
Spray Exh VFD Min	80%
Spray Exh VFD Max	100%
Cure Exh VFD Min	20%
Cure Exh VFD Max	75%

Technician 1 (Up/Down key for Tech #2-4)
Exhaust VFD Initial Start Speed Reference
Spray Mode Minimum Exhaust VFD Speed
Spray Mode Maximum Exhaust VFD Speed
Cure Mode Minimum Exhaust VFD Speed
Cure Mode Maximum Exhaust VFD Speed

Screen 3

Advanced Tech 1	
Disch Temp Filter	3
Disch Deriv Time	0s
Airflow Alrm Dly	30s
OA Temp Included	NO

Advanced Tech 1
Discharge Temp Input Filter Value
Discharge Derivative Time
Low Airflow Alarm Delay Time
Optional OA Temp Sensor Included

Screen 4

Advanced Tech 2	
Alarm Buzzer	ENABLED
Shtdwn After Cool	YES
Brnr On Sum Flash	NO
Strtr/VFD Loss During Run Fault Timer	10s

Advanced Tech 2
Alarm Buzzer Status
Shutdown After Cool Down Cycle
Burner Forced On In Summer Flash Mode
Starter/VFD Loss During
Run Fault Timer Setpoint

Screen 5

Advanced Tech 3	
Pr. Loop Params.	AUTO
Auto Loop Group	SLOW
Bth Pr Gain	2.2
Bth Pr Intg Time	20s
Bth Pr Derv Time	1s
Pr. Filter	8
Pr. Avg. Count	18

Advanced Tech 3
Pressure Loop Parameter Adjust (Auto or Man.)
Auto Loop Group (Slower, Slow, Medium, Fast)
Booth Press. Loop Gain
Booth Press. Loop Integral Time
Booth Press. Loop Derivative Time
Booth Press. Sensor Filter Constant
Booth Press. Moving Average Count

a15. _____ To access information about the software, select the information screen.

Information Screens:
Access these screens from quick menu. Use up down arrow keys to switch between screens while screens are in select mode.

Screen 1

Information Col-Met Mix Box HOT w/ BPC SW ver: X.X.XXX OS: X.X.XXX Boot: X.X.XXX	Information Col-Met Mix Box HOT w/ BPC AMU Application Version c.PCO OS Version c.PCO BIOS Version

a16. _____ If an alarm occurs, the alarm button will illuminate. Press the alarm button to view the alarm, then press and hold the button to clear the alarm.

Alarm Screen:
This screen is accessed if an alarm condition exists (pressing blinking alarm symbol) or it can be accessed from the main menu. Some alarms require acknowledgement in order to silence the alarm horn and/or reset the alarm. Press and HOLD the alarm key in order to acknowledge an alarm. If the alarm is based upon a direct external input from a sensor or external safety control (for example a motor overload), the alarm will remain active (key will blink red) until the external input is corrected. In other cases where the c.pCO module is acting as the safety device, holding the alarm key for a slightly longer duration will reset the alarm condition. Two "Sampled Values" will also be displayed. These values show the state of the named value at the time the alarm is triggered.

Screen 1

Alarms 01/01 08:29 03/23/15 Burner Enable Interlock DO_BurnerEnbl ON DI_BurnerOn OFF	Alarms (Number of Active Alarms) Time & Date of Alarm Event Alarm Name Sampled Value 1 Sampled Value 2

Section i of this guide covers the most common faults/alarms that occur.

Upon Arrival At Job Site

b1. _____ Ensure filters are correctly installed at the intake of the AMU (don't skip this step – system cannot be properly setup and balanced if filters are not correctly installed.)
b2. _____ Ensure filters are correctly installed and new at the intake of the booth (don't skip this step – system cannot be properly setup and balanced if filters are not correctly installed.). The green/blue side of the filter is sticky and should be on the down stream side of the air flow (sticky side of filter in the work area).
b3. _____ Ensure filters are correctly installed and new at the exhaust of the booth (don't skip this step – system cannot be properly setup and balanced if filters are not correctly installed.)
b4. _____ Ensure the plumber has purged the fuel line of air.
b5. _____ Ensure exhaust motor(s) are wired for proper voltage (don't skip this step – its very common for the motors to be wired incorrectly which will cause issues later on in this guide.)

b5a. L1 wire from the control panel is connected to: _____ on the motor

b5b. L2 wire from the control panel is connected to: _____ on the motor

b5c. L3 wire from the control panel is connected to: _____ on the motor

b5d. _____ on the motor are tied together

b5e. _____ on the motor are tied together

b5f. _____ on the motor are tied together

b6. _____ Write down (or take photo) the details on the exhaust motor(s) name plate

b6a. CAT Number: _____

b6b. HP: _____

b6c. FLA: _____

b7. _____ Ensure any fire suppression in or around the booth is rated for temperature capabilities of the AMU. (If sprinkler heads are Orange, Red, or Yellow they may be too low – check with fire suppression specialist if unsure. High temperature limit is set at 250F, so the heads need to be higher than that)
b8. _____ Ensure the pressure tube from the booth wall to the remote control panel is connected to the + side of the pressure sensor. The minus side of the sensor should be ran to outside of the control panel.
b9. _____ Ensure the "telephone plug" in the remote panel is not plugged in. Voltage needs to be confirmed before plugging in the cable.
b10. _____ Ensure the AMU motor has been wired to control panel, and that the belts/pulley/drive are secure.
b11. _____ Write down (or take photo) the details on the AMU motor name plate

b11a. Model number: _____

b11b. HP: _____

b11c. FLA: _____

b12. _____ Inspect + and - pressure sensing ports at the burner (see **j4** for photos of ports).
Port upstream before the burner is + and needs to be pointed into air stream away from burner
Port downstream after the burner is – and needs to be pointed towards the AMU fan

b13. _____ Inspect pilot gas plumbing into burner, igniter connector/wire, and flame rod connector/wire (see **j5** for photos of the igniter, flame rod, and pilot tubing).

b14. _____ Ensure the compressed air solenoid has been wired to the control panel, and that the air supply to the application equipment is plumbed through the solenoid. The solenoid is required by NFPA 33 and is designed to shut off the air supply to the application equipment if the fans are not running, if the unit is in cure mode, or if the fire suppression equipment is faulted. The solenoid should not interfere with "breathable air".

b15. _____ Locate the red & green tubes in the AMU control panel and remove the rubber caps. Connect the manometer (Dwyer 477AV-0) to the pressure tubes. Red tube connects to minus side of gauge, green tube connects to plus side of gauge. Gauge should be reading zero with fans off.

b16. _____ Inspect the communication wiring in the remote panel landed on the GA-1 device. This wiring is field connected between GA-1 and the Carel PLC in the AMU control panel. If the wiring is not connected correctly, the display and/or Carel PLC can be permanently damaged. Damaged displays or Carel PLCs are not covered under warranty.

b16a. Wire color on GA-1 terminal 1 _____

b16b. Wire color on GA-1 terminal 2 _____

b16c. Wire color on GA-1 terminal 3 _____

b16d. Wire color on GA-1 terminal 4 _____

b16e. Wire color on Carel PLC terminal J3 +Vterm _____ (should match b16a.)

b16f. Wire color on Carel PLC terminal J3 + _____ (should match b16c.)

b16g. Wire color on Carel PLC terminal J3 - _____ (should match b16d.)

b16h. Wire color on Carel PLC terminal J3 GND _____ (should match b16b.)

note: if 4 different colors are not available, it is recommended that the wires be traced using the continuity setting of a voltmeter (one wire at a time to ground).

Initial Start-Up

c1. _____ Open all doors on the booth
c2. _____ Confirm incoming voltage matches unit name plate (on inside door of control panel) before energizing disconnect (energize after confirmation)

c2a. L1 to L2: _____ **c2d.** L1 to Ground: _____

c2b. L2 to L3: _____ **c2e.** L2 to Ground: _____

c2c. L3 to L1: _____ **c2f.** L3 to Ground: _____

c3. _____ Confirm voltage between terminal 2 and 1B (approx. 120vac) Voltage Reading: _____
c4. _____ Confirm voltage between terminal 2 and 1A (approx. 120vac) Voltage Reading: _____
If there is no voltage on 1A, then check fire suppression system. If fire suppression system is not present, install jumper between 1A and 1B (de-energize panel first).
c5. _____ At the remote control panel, ensure the E-stop button is pulled out.
c6. _____ At the remote control panel, on the GA-1 device, measure the DC voltage before plugging in the "telephone cable"
c6a. Terminal 2 to Terminal 1 = +24 to +36 VDC (proper polarity is critical)
c6b. Terminal 2 to Terminal 3 = +2 to +3 VDC (proper polarity is critical)
c6c. Terminal 2 to Terminal 4 = +2 to +3 VDC (proper polarity is critical)
c7. _____ After DC voltage has been confirmed correct, plug in the "telephone cable" – the display should illuminate and show the home screen.
c8. _____ Adjust "booth pressure set point" to -0.099 (see step **a12** screen 4) which will force the exhaust VFD to ramp to 60hz (full speed).
c9. _____ Set mode to "summer" (this will prevent the burner from attempting to ignite)
c10. _____ Set spray temperature to 50F
c11. _____ At the AMU control panel, turn on SW5 – the inlet/discharge damper should open (damper can be located at inlet or discharge of AMU)
c12. _____ Visually inspect the damper to ensure it opens fully (if actuator is not tight, the actuator will open and prove, but the damper may remain closed).
c13. _____ After the damper is proven open, the AMU fan and exhaust fan(s) will begin to rotate.
c14. _____ Visually confirm AMU fan is rotating in the correct direction (arrow on the fan housing)
c15. _____ Visually confirm exhaust fan(s) is rotating in the correct direction (arrow on the fan housing)
c16. _____ Confirm AMU fan is running at 60.00hz (supply VFD)
c17. _____ Confirm AMU fan is not exceeding FLA rating when running at 60.00hz
Press "set" button on the VFD to display amps. Compare reading to AMU motor name plate from step **b11c.**
c18. _____ Confirm exhaust fan(s) is running at 60.00hz (exhaust VFD)
c19. _____ Confirm exhaust fan(s) is not exceeding FLA rating when running at 60.00hz
Press "set" button on the VFD to display total amps. Compare reading to exhaust motor name plate from step **b6c.** If there is more than one exhaust fan, use a true RMS ammeter to measure the amps at the output side of the exhaust fan overloads.
c20. _____ If the unit has exhaust overloads, ensure they are set to match the FLA rating on the exhaust motor name plates from step **b6c.**
c21. _____ Confirm VFD parameter P9 is set to match total FLA rating of exhaust motor(s)
Example 1: if there is 1 exhaust motor rated for 7.2 amps, ensure P9 is set for 7.2
Example 2: if there are 4 exhaust motors, each rated for 7.2 amp, ensure P9 is set for 28.8

Booth Balancing

d1. _____ Close the doors on the booth then check the booth pressure on the Corel controller. The booth pressure should be in the negative range at least -0.099, which will allow for exhaust chamber filter loading.

- If booth pressure is negative, adjust the "booth pressure set point" to -0.003 then allow the booth to stabilize (continue to step d4).
- If booth pressure is not at least -0.099 or is positive, then the exhaust system will need to be checked/modified to allow the booth to go negative.

d1a. Check exhaust duct for restrictions. Ensure the ventilator gravity damper at the end of the duct is opening. By default, RTT designs the exhaust system for .5" w.c. which allows for no turns or offsets in the ductwork. If there are offsets, transitions and/or elbows in the duct, the fan may not be rated to handle the additional static pressure created by the turns. Check the plan view/approval drawing of the booth to determine the exhaust fan CFM & static pressure capabilities. Double check fan rotation.

d1b. Check the exhaust filters. By default, RTT designs an exhaust chamber for single stage filtration. If the customer has installed a blanket and pocket filters, the fan may not be rated to handle the additional static created by the filters. Check the plan view/approval drawing of the booth to determine the exhaust fan CFM & static pressure capabilities.

d1c. Check the exhaust motor amps at 60.00hz. If the amps are lower than the rated motor FLA, the exhaust VFD will need to be adjusted so that the motor drives up to FLA. Example: motor is rated for 7.6a but is only drawing 6.1a. Adjust VFD to higher frequency such as 65.00hz. Continue adjusting up until FLA is achieved.

P77 = 2 (Unlock)
P1 = new max freq reference (start at 65 then check amps)
P55 = same as P1 (freq monitor reference)
P125 = same as P1 (freq setting gain)
C2 = same as P1 (freq setting bias)
P77 = 1 (lock – Do this after amp checks)

d1d. If the booth still will not go negative after all of the above have been adjusted, then the AMU fan speed may need to be reduced. Reducing the AMU fan speed will cause the burner profile pressure to drop. The pressure must be between .5" and .7" for proper combustion. As the AMU fan speed is reduced, the profile damper around the burner will need to be manually closed to increase the pressure across the burner. Follow these steps:

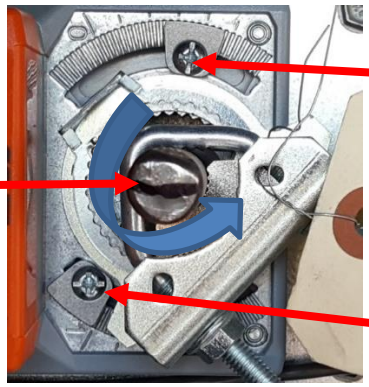
d1e. Reduce AMU fan speed by 3hz

P77 = 2 (Unlock)
P1 = new freq reference (lower than 60hz)
P2 = minimum freq reference (needs to be lower than P1)
P55 = same as P1 (freq monitor reference)
P125 = same as P1 (freq setting gain)
C2 = same as P1 (freq setting bias)
P77 = 1 (lock)

d1f. Check burner profile pressure, and manually close profile as needed to achieve .5” to .7”. Tighten the mechanical stop on the actuator at the new location so that the damper cannot fully open during spray mode.

Release Clutch Button (Press & Hold to manually turn actuator/damper by hand)

Profile Damper Actuator



Cure Mode Stop Position

Damper Position Indicator

Spray Mode Stop Position

Turn the damper shaft towards the closed position until you achieve the desired .6” w.c. on the manometer, then adjust the “Spray Mode Stop Position” screw so that it butts up against the actuators new position.

Manometer reading .6” w.c. air pressure across the burner profile opening.

d1g. Check booth pressure to see if it is at least -0.099
d1h. Repeat steps **d1e** through **d1g** until profile pressure is .5” to .7” and booth pressure is -0.099. If the AMU VFD must be set lower than 48hz, then there may be some other problem with the exhaust system. Check the exhaust duct, filters, fan serial plate, motor HP, belt tension, etc. to ensure all other external factors are accounted for.
d1i. Ensure P42 is set lower than P1

d2. _____ With the booth doors closed, adjust the "booth pressure set point" to 0.099 which should cause the booth doors to pop open.

- If the booth doors do not pop open, check the hz on the exhaust VFD. The hz should be lower than 45.00. If the hz does not drop below 45.00, then the lower limit set point in the Corel controller needs to be adjusted down. Log in as technician and adjust "Spray Exh VFD Min" set point.

d3. _____ Adjust "booth pressure set point" to -0.003 and allow pressure to stabilize.

d4. _____ Check the Dwyer 477AV-0 gauge that is connected to the red & green tubes in the AMU control panel. This gauge is showing the pressure across the burner profile plates. Gauge should be reading between .5" and .7"

d4a. If reading is higher than .7", then AMU fan is moving more air than expected across the burner. The AMU fan speed will need to be adjusted down so that the pressure reads between .5" and .7".

P77 = 2 (Unlock)
P1 = new freq reference
P2 = minimum freq reference (needs to be lower than P1)
P55 = same as P1 (freq monitor reference)
P125 = same as P1 (freq setting gain)
C2 = same as P1 (freq setting bias)
P77 = 1 (lock)

d4b. If reading is lower than .5", then AMU fan is moving less air than expected across the burner. The profile pressure can be increased in 2 ways depending on the how well the booth is balancing.

d4b1. If the booth is easily capable of -0.099" then

a. Speed up the AMU fan higher than 60.00hz until FLA (step **b11c**) is achieved
b. Check the burner profile pressure to see if it is between .5" and .7"
c. If burner profile pressure is still less than .5" when AMU fan is running at FLA, close profile damper around the burner until pressure is between .5" and .7"

d4b2. If the booth is barely capable of -0.099 then

Close the profile damper around the burner until burner profile pressure is between .5" and .7"

Combustion Setup

e1. _____ Check incoming fuel pressure using the Dwyer 477AV-3 (0" to 200") Manometer. In most cases, pressure needs to be between 50"w.c. and 62"w.c.. Check AMU name plate to confirm.

If pressure is zero – ensure all ball valves/meters upstream of the unit are turned on

If pressure is between 1" and 50", contact gas supplier/plumber to see if pressure can be increased.

If pressure is above 62", contact gas supplier/plumber to have regulator installed/adjusted.

e2. _____ Remove the red cover from the FireEye controller. Locate the "run/check" toggle switch and ensure it is set for "run".

e3. _____ With the fans running, connect Dwyer 477AV-0 (0" to 10") Manometer to the burner manifold pressure test port. Note the pressure reading (should be negative at this time, typically -1" to -2").

e3a. Burner off, fan running - Manifold Pressure: _____

e4. _____ At the AMU control panel, with the fans running, turn on SW6. The burner should attempt to ignite. When the ignition sequence begins, put the run/check toggle switch on "check" – this will allow the pilot to ignite, but not the main flame.

e4a. igniter will energize creating a spark within the burner

e4b. pilot solenoid will energize allowing fuel to flow into burner

e4c. FireEye controller will check for flame signal from flame rod

e5c. If the flame fails to ignite and a "Burner Enable Interlock" fault occurs, see i6

e5d. If the flame fails to ignite and a "Flame Safeguard" fault occurs, see i5

e5. _____ Visually inspect the pilot flame through the sight glass. The pilot should be about the size of a golf ball.

e6. _____ Check the DC flame signal at the test ports on the FireEye flame controller. Voltage should be between 7vdc and 10vdc.

e7. _____ Turn off SW6 and put the run/check toggle switch on the FireEye to "run".

e8. _____ Turn on SW6. The burner should attempt to ignite.

e8a. igniter will energize creating a spark within the burner

e8b. pilot solenoid will energize allowing fuel to flow into burner

e8c. FireEye controller will check for flame signal from flame rod

e8d. if flame is proven, FireEye will energize main gas valves

e9. _____ Visually inspect the main flame through the sight glass. The low fire flame should be as small as possible while still propagating all the way across the burner (no flickering).

e10. _____ Engage the clutch on the gas actuator so that it can be turned manually.

e11. _____ After the gas valves energize, force the gas actuator to the high fire position and record the burner manifold pressure. (NOTE: Don't leave the actuator at high fire for too long, or the high temp limit may fault.)

e11a. Burner Manifold Pressure Reading at High Fire:_____

e12. _____ Force the gas actuator to low fire position. Add the "burner off" reading (**e3a.**) to the high fire reading (**e11a.**) to determine the total manifold pressure.

e3a. _____ + **e11a.** _____ = **e12a.** _____

(burner off) (burner hi fire) (total pressure)

Example: burner off: -2" burner at high fire: +6" total pressure = +4"

e13. _____ Compare total manifold pressure reading (**e12a.**) to nameplate on the door of the control panel. Adjust the main gas regulator as needed to achieve design manifold pressure (screw in for more gas pressure, screw out for less gas pressure).

e14. _____ After manifold pressure is at proper range, visually inspect burner to ensure low fire flame is not flickering across the burner. The low fire flame should be as small as possible while still propagating all the way across the burner.

If flame is large, reduce low fire position on the gas actuator

If flame is flickering, increase low fire position on the gas actuator

e15. _____Release the clutch on the gas actuator so that the Corel controller can control the actuator

e16. _____ Turn off SW6 and SW5 (burner and fans will shut down)

System is now ready for testing from the operator's remote panel

Booth Operation Testing

f1. _____ Set system to “Summer” mode
f2. _____ Setup recipe D to the following settings:
- **f2a.** Spray Temp Set: 75
- **f2b.** Flash Temp Set: 85
- **f2c.** Flash Seconds: 180
- **f2d.** Cure 1 Temp Set: 140
- **f2e.** Cure 1 Minutes: 5
- **f2f.** Cure 2 Temp Set: 160
- **f2g.** Cure 2 Minutes: 5
- **f2h.** Cool Temp Set: 80
- **f2i.** Cool Seconds: 180

f3. _____ Ensure all booth doors are closed then press “Start” button on remote panel and confirm the following:
- **f3a.** _____ All fans begin running and booth doors remain closed.
  If booth doors pop open, latches should be checked to ensure they have been tightened. If latches are tight and doors continue to pop open, see section d of this guide.
- **f3b.** _____ After fans are running, booth pressure settles in about -0.003” w.c.
- **f3c.** _____ Burner does not ignite
- **f3d.** _____ Allow system to run for 11 continuous minutes to ensure no faults occur

f4. _____ Press “Stop” button on remote control panel and confirm the following:
- **f4a.** _____ All fans turn off and booth doors remain closed
  If booth doors pop open, latches should be checked to ensure they have been tightened
  If latches are tight, VFD parameters will need to be adjusted to allow exhaust fan(s) to ramp down slower than supply fan.

f5. _____ Set system to “Winter” mode and press “Start” button
f6. _____ After booth balances and burner ignites, allow to run for 5 continuous minutes
f7. _____ Set system to run Recipe D, then press “Cure” button. The following should occur:
- **f7a.** Countdown timer should begin running, booth lights should turn off, and temp set point should be 85
- **f7b.** Burner should be on, and discharge temp should be around 85
- **f7c.** After 180 seconds, temp set point should change to 140, and booth fans should slow down
- **f7d.** Discharge temp should rise to around 140
- **f7e.** After 5 minutes, temp set point should change to 160
- **f7f.** Discharge temp should rise to around 160
- **f7g.** After 5 minutes, temp set point should change to 80
- **f7h.** Discharge temp should drop to around 80
- **f7i.** After 180 seconds, burner and fans should shutdown

f8. _____ Setup recipe C to the following settings:
- **f8a.** Spray Temp Set: 75
- **f8b.** Flash Temp Set: 85
- **f8c.** Flash Seconds: 180
- **f8d.** Cure 1 Temp Set: 170
- **f8e.** Cure 1 Minutes: 5
- **f8f.** Cure 2 Temp Set: 170
- **f8g.** Cure 2 Minutes: 1
- **f8h.** Cool Temp Set: 80

f8i. Cool Seconds: 180

f9. _____ Set system to “Summer” mode and press “Start” button

f10. _____ After booth balances, allow to run for 5 continuous minutes and confirm burner remains off

f11. _____ Set system to run Recipe C, then press “Cure” button. The following should occur:

f11a. Countdown timer should begin running, booth lights should turn off, and temp set point should be 85

f11b. Burner should be on, and discharge temp should be around 85

f11c. After 180 seconds, temp set point should change to 170, and booth fans should slow down

f11d. Discharge temp should rise to around 170. Monitor the high temp limit to ensure it doesn’t fault. If a high temp limit fault occurs, the booth temperature probe may need to be relocated closer to the AMU discharge.

f11e. After 6 minutes, temp set point should change to 80

f11f. Discharge temp should drop to around 80

f11g. After 180 seconds, burner and fans should shutdown

Operator Training

Date _____ Unit Serial Number _____

Job Site Address _____

Training Technician Name _____

Trainee Name _____ Signature _____

Trainee Name _____ Signature _____

Trainee Name _____ Signature _____

Trainee Name _____ Signature _____

Trainee Name _____ Signature _____

Trainee Name _____ Signature _____

g1. _____ Explain overall system design

g1a. _____ Air is introduced through intake duct to AMU filters

g1b. _____ Where AMU filters are located and how to replace

g1c. _____ Note the location of the intake damper (before/after the AMU) and explain that the damper is closed when the fans are not running.

g1d. _____ After air travels through filters, it passes over the burner to be heated (if needed)

g1e. _____ Air is pulled into the AMU fan and is then blown into the booth plenum

g1g. _____ Air passes through the booth intake plenum filters

g1g. _____ Where booth plenum filters are located and how to replace (correct direction)

g1h. _____ Air enters booth work area, travels around product, and is pulled towards exhaust chamber filters.

g1i. _____ Where booth exhaust filters are located and how to replace (manometer readings)

g1j. _____ Air passes through exhaust filters into exhaust ductwork, through the exhaust fan and out of the building to the **A**utomatic **R**oof **V**entilator (gravity damper that closes when fan is not moving air)

g2. _____ Explain booth balancing

g2a. _____ Amount of air being pulled by exhaust fan needs to be about the same amount of air being introduced by AMU.

g2b. _____ If more air is being removed than introduced, booth is running “negative”. This will cause doors to slam shut, and debris may be able to enter booth through any unfiltered areas (un-even seals around doors, if doors are opened while in operation, etc.)

g2c. _____ If more air is being introduced than being removed, booth is running “positive”. This will cause doors to pop open.

g2d. _____ Generally, booth pressure should be about 0.000” w.c. or “balanced” to prevent unwanted debris in a negative condition, or doors popping open in a positive condition.

g2e. _____ Explain that booth doors need to be kept closed in order to read booth pressure, and for the system to automatically maintain the pressure set point.

g3. _____ Explain how to log in to the controller

g4. _____ Explain how to adjust booth pressure set point

g5. _____ Explain the difference between "Winter" and "Summer" mode and when to select which

g5a. _____ Summer mode means the fans run with the burner off. The unit cannot cool the air coming in from outside the building. If the outdoor air is 95F, then the air coming into the booth will be 95F. If that condition, the burner is not needed, so Summer mode should be selected. Summer mode only disables the burner during spray mode; when a cure cycle is started the burner will automatically ignite.

g5b. _____ Winter mode means the burner will ignite when the fans are running. If the outdoor temperature is 50F, then the burner is most likely needed, so Winter mode should be selected.

g6. _____ Explain the concept of a recipe

g6a. _____ Spray Mode – when the operators are painting

g6b. _____ Flash Mode – after the paint is applied, some coatings need a period of time to "flash off" before going to a high temperature. (See spec sheet of coating for info).

g6c. _____ Cure 1 Mode – after the flash off delay, the booth can go to a higher temperature set point to bake the paint.

g6d. _____ Cure 2 Mode – some applications require a 2nd temperature set point so that the paint can be brought up to temperature more slowly. Use cure 2 for a 2nd higher set point if needed.

g6e. _____ Cool Mode – after the high temperature cool cycle, the booth is brought back down to ambient temperature to allow the product to cool.

g7. _____ Explain how to set up a recipe. This is a good opportunity to allow an operator to start using the buttons and get familiar with the controller (allow an operator to input the values needed for their specific recipe set points).

g7a. Set recipe A

g7b. set spray temp to their desired set point

g7c. set flash temp to their required temperature set point as found in their paint spec sheet

g7d. set flash seconds to the amount of time required for their paint to flash as found in their paint spec sheet.

g7e. set cure 1 temp to their required temperature set point as found in their paint spec sheet

g7f. set cure 1 minutes to the amount of time required for their paint to cure as found in their paint spec sheet.

g7g. set cure 2 temp if needed

g7h. set cure 2 minutes if needed

g7i. set cool temp to their desired temperature set point

g7j. set cool seconds to their desired amount of cool time

g8. _____ Explain that there are 3 other available recipes that they can set up if desired.

g9. _____ Ensure booth doors are closed and then have the operator press the start button

g9a. _____ Explain that there is a delay as the damper for the AMU must be proven open before the fans can run.

g9b. _____ Explain how when the fans turn on, the booth pressure will fluctuate as the controls begin to sense and adjust to the booth pressure.

g9c. _____ set the system for "Winter" mode and show the icon that illuminates when the burner has ignited, and how the discharge temperature increases.

g10. _____ set the unit for recipe D (short cycle) and allow the booth to go through a short cure cycle, explaining each step as it occurs.

g10a. _____ flash temp & time

g10b. _____ cure 1 temp & time

g10c. _____ cure 2 temp & time

g10d. _____ cool temp & time

g10e. _____ booth shutdown

g11. _____ Explain the compressed air solenoid interlock
g12. _____ Go to the AMU main control panel and point out/explain the purpose of:
- **g12a.** _____ main disconnect switch
- **g12b.** _____ fuses for VFD and control circuit
- **g12c.** _____ supply and exhaust VFDs
- **g12d.** _____ control transformer
- **g12e.** _____ carel controller
- **g12f.** _____ flame controller
- **g12h.** _____ high temp limit
- **g12i.** _____ gas pilot line (regulator, solenoid, test ports)
- **g12j.** _____ main gas line (regulator, blocking valves, actuator, high pressure switch, test ports)
- **g12k.** _____ profile damper and actuator
- **g12l.** _____ MFG sticker, schematic, and manual on door

g13. _____ Show the location of the AMU inlet/discharge damper
g14. _____ Show the location of the booth temperature probe
g15. _____ Show the location of the booth exhaust fan(s)
- **g15a.** _____ belts tension needs to be inspected/adjusted after the first 40 hours of use, then follow the PM in the manual.
- **g15b.** _____ fan bearings are sealed/non-serviceable

g16. _____ Show the location of the AMU fan
- **g16a.** _____ belts tension needs to be inspected/adjusted after the first 40 hours of use, then follow the PM in the manual.
- **g16b.** _____ fan bearings are to be lubricated per the PM schedule in the manual.

Final Checklist

h1. _____ Booth fans start/stop from remote operator panel
h2. _____ Booth doors do not blow open during fan startup/shutdown
h3. _____ Compressed air solenoid is only energized when booth fans are running, and cure mode is off
h4. _____ Exhaust filter manometers are installed and working properly
h5. _____ booth balances to 0.000" or slightly negative with exhaust VFD at 55.00hz or less
h6. _____ AMU burner ignites consistently without faults from the operator remote panel (winter mode)
h7. _____ Booth has run through a minimum of 5 consecutive cure cycles without faults or alarms
h8. _____ Caps have been put back on the green and red tubes in the AMU control panel
h9. _____ All gas train test ports are closed and tight
h10. _____ All access doors on the AMU are closed
h11. _____ Customer/Operators have been trained using steps g1. through g16.

Technician Signature: Printed:

Customer Signature: Printed:

Distributor Signature: Printed:

Frequently Asked Questions & Faults

i1. "No Link" Shown on the Carel Display

The remote display is not communicating with the Carel controller in the AMU control panel.

1. See steps b16 and c6

i2. "VFDs Power Up And Display Numbers, But No Power To Anything Else"

1. Is the emergency stop button at the remote panel pulled out?
2. Is the fire suppression equipment (by others) connected properly?
    a. If fire suppression is not connected, a jumper needs to be installed on the terminal block. See the schematic for the unit to determine which terminal numbers to jumper. **(c3. – c4.)**

i3. "Blower Start Fault" Shown on the Carel Display

The Carel controller told the fans to run, but the fans did not prove running.

1. Visually inspect the AMU inlet/discharge damper to ensure its opening and that the limit switch is proving its open **(c11. – c12.)**
2. If the booth has more than one exhaust fan, there will be overloads on the output side of the exhaust VFD. Check the overloads for a faulted condition **(c20. – c21.)**
3. Check the VFDs for fault codes. A common fault is E.THN which means the motor was drawing more amps than the value set in P9.
4. Reset the VFDs by turning off the power for 3 minutes and then re-energizing the panel.

i4. "Low Airflow" Shown on the Carel Display

The Carel controller proved that the fans are running but did not see enough air pressure across the burner.

1. Visually inspect the inlet/discharge damper – the Belemo actuator could be loose on the shaft of the damper which would allow the Belemo to "prove" open, but not actually open the damper. **(c11. – c12.)**
2. Ensure the caps are on the red and green tubes (tees) in the AMU control panel. If a manometer is not connected to the tubes, the caps must be securely attached to the tees to prevent the tees from leaking.
3. If caps are in place, remove caps and connect a manometer to the tubes. Using the manometer, measure the air pressure between the red and green tubes at the PS-1 pressure switch in the AMU control panel. **(d4.)**
4. Check the AMU filters condition (clogged filters reduce air flow)

The exhaust fan overloads tripped due to over amperage

1. Press reset button on each exhaust fan overload
2. Check amps when the exhaust fan is running at full speed
3. Compare measured amps to motor name plate (measured amps should be equal to or lower than name plate marking)
4. Ensure overload setting matches motor name plate or is set to 125% of motor FLA rating.

i5. "Flame Safeguard" Shown on the Carel Display

The Carel controller told the burner to ignite, and the Fire Eye attempted to ignite the flame by energizing the igniter and pilot gas valve but was not able to prove the flame came on ("flame fault").

1. Check the Fire Eye alarm codes for details (operation manual page 31)
2. Turn on the burner and watch through the site glass, look for spark, then pilot light, then main flame.

If no spark: inspect the igniter and cable. Check the voltage leaving the output of the Fire Eye (terminal 4)

If spark but no pilot: check gas pressure. Ensure gas is leaving the pilot solenoid into the burner. NOTE: too much gas pressure (usually more than 2psi or 56"w.c.) can cause the pilot regulator to seize up and not allow gas through the pilot solenoid into the burner.

If spark, pilot, but no main flame: inspect flame rod and cable. Test voltage on Fire Eye DC test terminals – should be between 4 and 10 VDC

2. To reset this fault, press and hold the reset button on the Fire Eye for 3 seconds, then press and hold the alarm triangle on the Carel controller.

i6. "Burner Enable Interlock" Shown on the Carel Display

The Carel controller told the burner to ignite, but the burner didn't prove on or issue a "flame fault"

1. Check the high gas pressure switch. In some cases, if the ductwork was not properly sealed, rain/snow can make its way into the burner and then fill the gas line with water. With the unit off, loosen the pipe union on the downstream side of the valve train and see if water drains out.

2. Check the high temperature limit. If the temperature in the fan housing exceeds about 225F to 250F, the limit will trip and requires a manual reset. If the problem persists, the booth temperature probe may be too far away from the discharge of the AMU, or the gas actuator may have failed in the open position.

3. Check the profile pressure (red and green tubes) to ensure it is lower than .9"w.c. If the pressure exceeds .9", power is not able to reach the flame controller. Adjust the profile damper so that pressure is .6" w.c.

i7. "Booth Doors Are Blowing Open/Too Much Positive Pressure"

Several items need to be addressed in order to achieve a properly balanced booth that will also allow the AMU to consistently ignite the burner. "Start-Up" is a procedure that is done when the equipment is new at your facility. The "Start-Up" procedure involves dozens of steps checking various items to ensure things are operating properly. If "Start-Up" has not been performed on the unit, then it is very likely that the booth will not balance (perform start-up outlined in sections A through H of this guide to resolve the issues).

Quick items to check:

Are any of the belts broken on any of the fans?
Are all of the fans rotating the correct direction?
What is the booth pressure set point on the Carel controller? (needs to be 0.000)
Is the pressure sensing tube properly connected to the transmitter?
Is the exhaust VFD ramping up to 60hz?
Is the damper (ARV) at the end of the exhaust stack opening?
Are the exhaust filters new?
Do the specifications of the exhaust filters match what was supplied by RTT?
Are there turns/offsets in the exhaust ductwork?
What is the amperage rating of the exhaust fan and how many amps is it pulling at 60hz?

i8 "Low Discharge Temp" Shown on the Carel Display

The Carel controller detected that the air coming into the booth is too cold. In an effort prevent damage to equipment/product, the controller will shut off the fans/booth if it detects cold air for too much time. This situation could occur if the booth/area was un-occupied and the system was set in "summer" mode (operator didn't tell the burner to come on) and the temperature outside drops

below freezing. This feature will prevent freezing air from being brought into the system

1. Ensure the temperature is being displayed on the Carel controller. If it shows "#####" or "*****" then there is an issue with the temperature sensor, or the wiring between the sensor and the Carel controller.
2. Ensure the system is set to "Winter" mode if the outdoor air is expected to be below freezing.

i9. "Discharge Temp Sensor" Shown on the Carel Display

The Carel controller did not detect a signal from the discharge temperature sensor.

1. Inspect the discharge temperature sensor
2. Inspect the wiring between the temperature sensor and the Carel controller.

i10. "Booth Doors Pop Open When The Fans Turn On"

The acceleration time on the exhaust VFD needs to be adjusted so that the exhaust fan will ramp up more quickly which will maintain a negative/neutral pressure in the booth.

1. Adjust exhaust VFD parameter P7 to 30 (seconds). The lower the value, the faster the exhaust fan will ramp up to speed. Do not set below 20 unless instructed to do so by the factory.

i11. "Booth Doors Pop Open When The Fans Turn Off"

The deceleration time on the exhaust VFD needs to be adjusted so that the exhaust fan will ramp down more slowly which will maintain a negative/neutral pressure in the booth.

1. Adjust exhaust VFD parameter P250 to 9999 (ramp to stop)
2. Adjust exhaust VFD parameter P8 to 45 (seconds) or higher. The higher the value, the longer it will take fan will ramp down to a stop.

i12. "Fan begins to ramp up, but then turns off. No faults shown on the Carel controller or VFDs"

Disconnect all wiring going to door limit switches and compressed air solenoid, then try to run the fans. If the fans operate normally, then there is an issue with the field wiring for the door limits, or compressed air solenoid (check for shorts to ground, mis-wired contacts, etc.) Do not install a jumper between terminals 74 & 2 – this will cause a direct short to ground when the VFDs prove the fans are running.

i13. "Random blower start fault and operator does not have to reset anything, just presses start button to resume normal operation"

1. Inspect all relays in the main control panel to ensure they are securely attached to their base.
2. Inspect all wiring connections on the top and bottom of the relays (look for loose connections).
3. Gently tap on each relay while the unit is in operation. If the fault occurs, then one of the relays could be defective and should be inspected/replaced.
4. Ensure no unauthorized field wiring modifications have occurred. Adding unauthorized components (larger compressed air solenoid, alarm buzzers, stack lights, etc.) to the system can increase the amperage draw on the control transformer which will create voltage drops that will cause unexpected behavior in the system.

i14. “Exhaust VFD does not ramp up to 60hz”

1. Ensure tubing is properly connected from the remote panel to the booth wall.
2. Ensure the booth pressure set point is in the negative range.
3. Ensure all booth doors are closed.
4. Measure voltage on the PS1 pressure transmitter. If pressure tubing is connected and voltage is 0 then transmitter may be defective. Tee in a manometer with the transmitter to confirm. If manometer is showing pressure and voltage is still 0, replace transmitter.

Component Identification

j1. - Main Control Panel On The AMU

NOTE: Component size and layout may vary

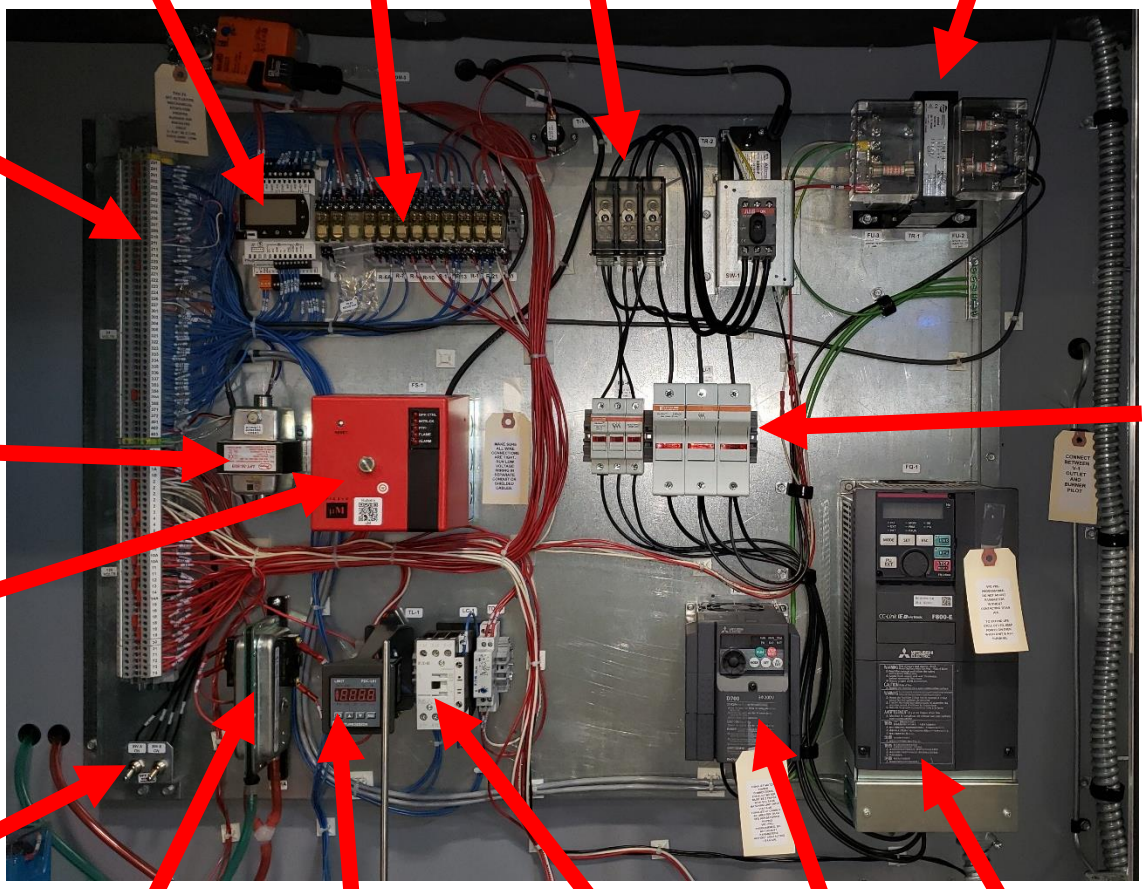
PLC (Carel Controller)
Controls fan on/off, burner on/off, and cure logic.

Relays
Various switching of control circuits.

Power Distribution
Splits the main power into branches

Control Transformer
Lowers incoming voltage to 120vac

Terminal Blocks
Field wiring connections land here.



Transformer
Provides 24vac to various components.

Fuses/Branch Circuit Protection
Protection for the power circuit devices (VFDs, Control Transformer, Lights, Etc.)

Flame Controller.
(Fire Eye)
Monitors flame condition and controls gas blocking valves/pilot.

Service Switches.
Labeled SW5 & SW6. Allows local control of the unit so that you don't have to go to the remote control panel to start/stop.

SW5 = Fans on/off
SW6 = Burner on/off

Note: Switches should be off for normal operation.

Note: Switches may be located in other area of the panel such as on the terminal strip DIN rail.

Air Pressure Switches.
Prevents combustion if air pressure across the burner is too low or too high.

High Temp Limit.
Shuts off the burner if the temperature is too high. On cure models, this is digital.

Booth Lights Contactor
Relay to turn booth lights on/off.

Exhaust Fan VFD
Controls speed of exhaust fan(s)

AMU Fan VFD
Controls speed of AMU fan

Exhaust Fan Overloads
Units that control more than 1 exhaust fan will have an individual overload for each fan.

Reset Button
Resets the overload to allow the exhaust fans to run again. Check exhaust fan amperage after reset to ensure the amperage does not exceed the motor's FLA rating.

j2 - Valve Train

NOTE: Component size and layout may vary

Profile Pressure Test Ports
Allows technician to connect manometer to view air pressure across the burner.

Incoming Gas Pressure Test Port.
¼" threaded cap – remove and connect manometer to measure incoming fuel pressure.

Pilot gas Regulator.
Reduces incoming line pressure for proper pilot size.

Pilot gas Solenoid.
Turns gas on/off to pilot.

Burner Manifold Pressure Test Port
¼" threaded cap – remove and connect manometer to measure fuel pressure going into the burner.

Gas Actuator
Controls gas flow to burner.

Primary Gas Valve.
Turns gas on/off.

Main Gas Inlet.
2 lbs. (56"w.c.) gas pressure typical.

High Gas Pressure Switch
Monitors gas pressure entering the burner, if pressure exceeds setting, switch will open and de-energize power to flame controller interlock circuit.

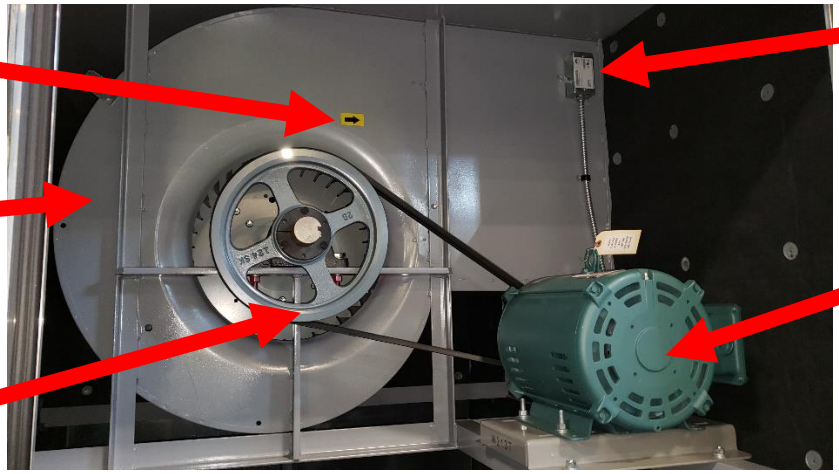
Main Gas Regulator.
Controls gas pressure to burner during main flame.

Low Fire Position Set Screw
Prevents the actuator from closing all the way to zero. Adjust as needed to increase or decrease low fire setting.

Manometer connected to test port
Measure incoming fuel pressure
Typical Requirements:
Minimum: 50" w.c. (1.8 PSI)
Maximum: 62" w.c. (2.2 PSI

See Unit MFG Tag for proper incoming pressure.

j3 - AMU Fan (Intake for booth)



Rotation Indication.

Fan Housing.

Belt & Drive.

High Temperature Limit Sensor.
Monitors air temperature leaving the fan housing. If temperature exceeds set point, high temperature limit controller will turn off burner.

Motor.
3 phase, various HP ratings.

j4 - Burner & Profile Opening

"Low" Pressure Sensing Port.
Should be pointed towards the fan housing. Connects to the low side of the pressure switch in the control panel.

Pilot Gas Line
Connects to pilot solenoid in control panel.

Burner
Various lengths based on BTU requirements of the unit.

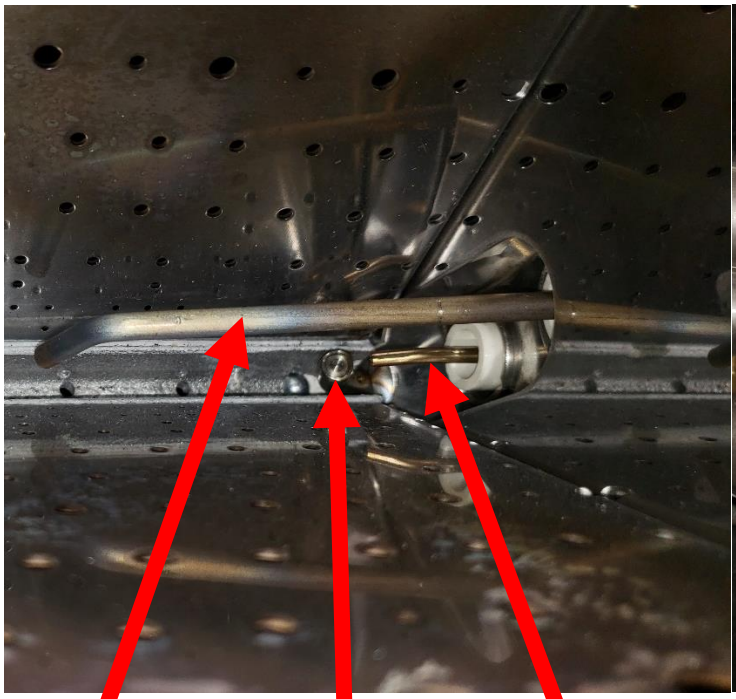
Profile Damper
Normally open during "spray" mode.
Closes during "cure" mode.

Open Damper = lower profile pressure
Closed Damper = higher profile pressure

Flame Rod
Detects presence of a flame within the burner. Connects to Fire Eye flame controller in control panel.

"High" Pressure Sensing Port.
Should be pointed away from the burner. Connects to the high side of the pressure switch in the control panel.

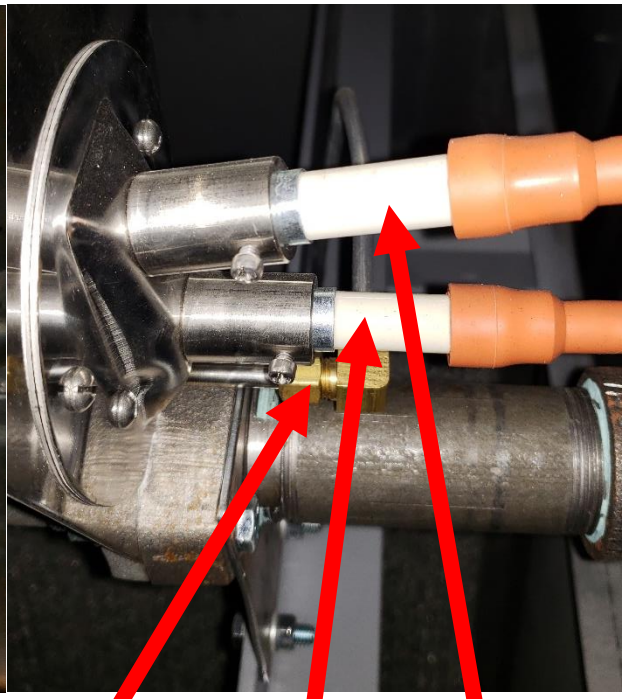
j5 - Pilot Igniter and Flame Rod



Flame Rod

Pilot Gas Line

Igniter

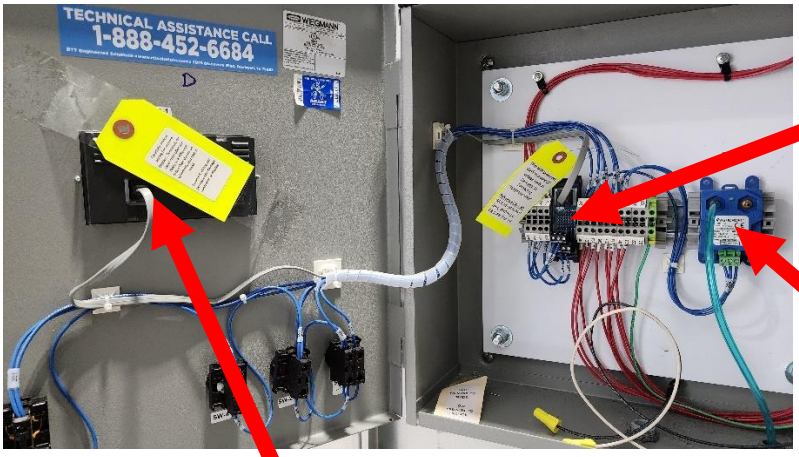


Pilot Gas Line
Connects to pilot solenoid in control panel.

Igniter
Energizes during the "trial for ignition" (TFI) to ignite the gas coming in from the pilot line. Connected to ignition transformer in the control panel.

Flame Rod
Detects presence of a flame within the burner. Connects to Fire Eye flame controller in control panel.

j6 - Inside remote control panel



GA-1 Terminal Block
Converts bare field wiring to "telephone plug" cord

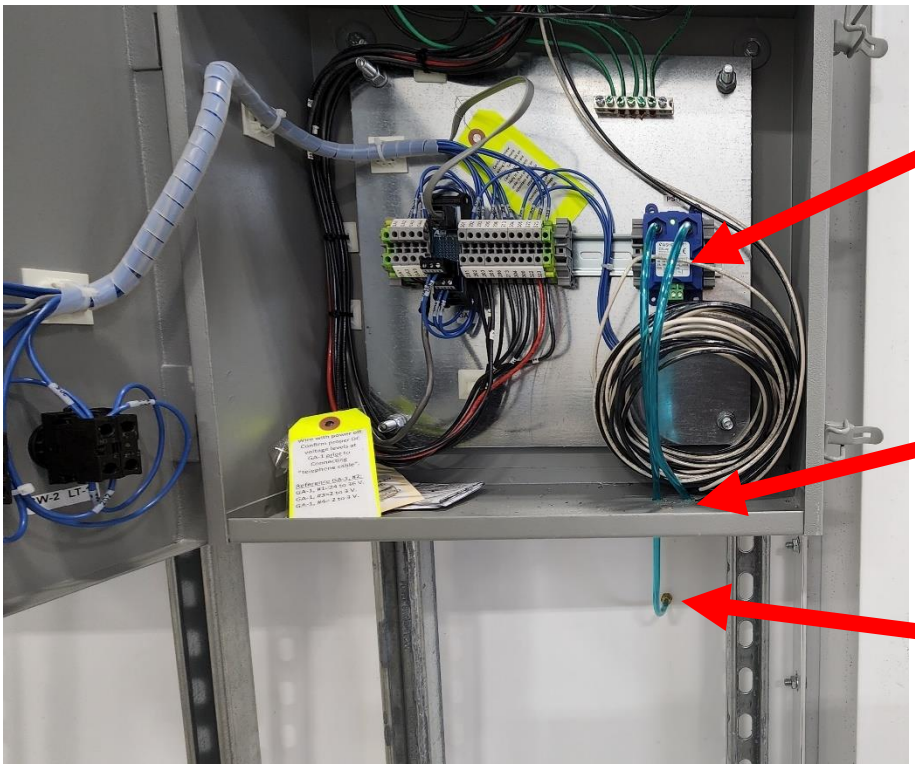
PS-1 Pressure Transmitter
High side connects to booth wall
Low side runs outside of control panel to atmosphere.

Sends DCV signal to Carel controller to indicate booth pressure. Carel controller uses the "Booth Pressure Set Point" to modulate the exhaust fan speed based on the signal this transmitter is sending.

"Telephone Plug"
Communication & Power cord between remote display and Corel controller located in main control panel.

IMPORTANT – This cord should not be plugged in until proper voltage readings have been confirmed. (step c6)

j7 - Booth pressure tubing connections

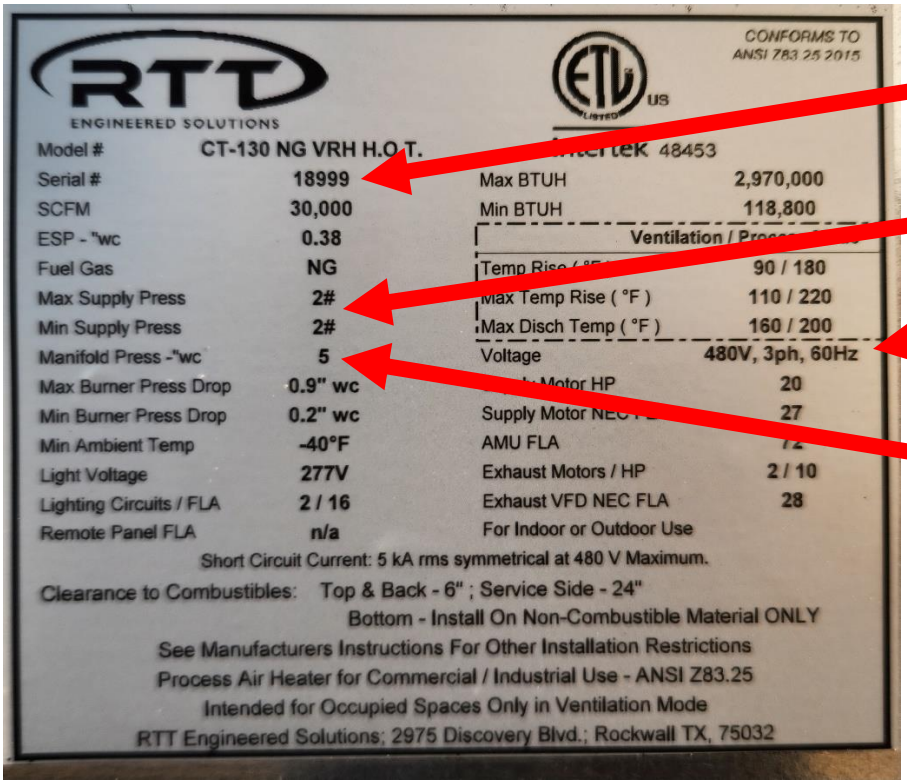


PS-1 Pressure Transmitter

Low side vents to atmosphere to measure pressure outside of the booth.

High side connects to booth wall to measure pressure inside the booth.

j8 - Unit manufacturing tag attached to the inside of the main control panel door on the AMU



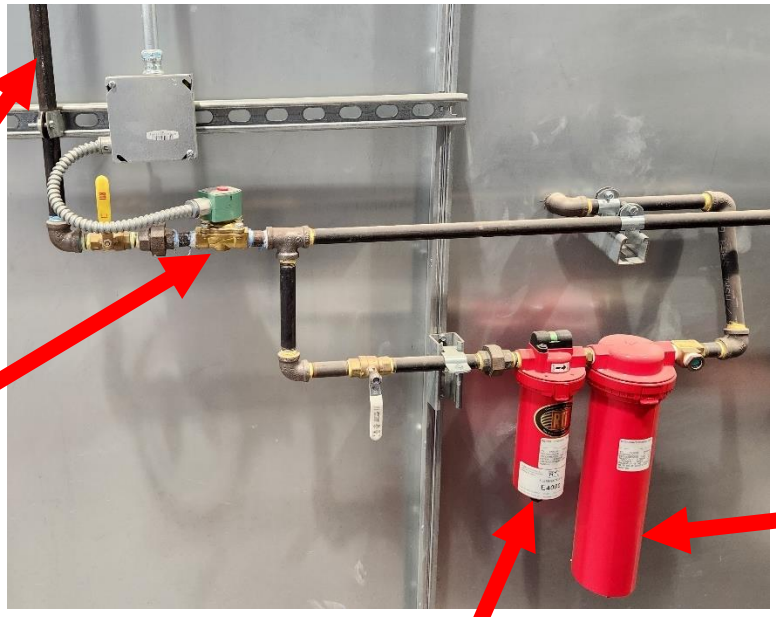
Unit Serial Number
Have this number available prior to calling RTT technical support.

Required Fuel Pressure
Ensure the fuel pressure entering the valve train matches the value shown on your tag.

Required Voltage
Ensure voltage at the top of the disconnect matches the rated voltage on your tag prior to energizing the disconnect.

Burner Manifold Pressure
Fuel pressure at high fire

j9 - Example of compressed air solenoid interlock



Compressed air line from building
Plumbing from the air compressor.

Compressed air solenoid interlock
The solenoid is normally closed meaning that air cannot flow through it until it is energized. The solenoid is only energized when the control panel confirms the appropriate conditions have been met.

Compressed air to application equipment inside the booth.
Inside the booth is a female compressed air fitting where the operator connects the application equipment.

Additional ports
Compressed air line to additional ports located on the other side of the booth.

Filter (by others)
Prevents oil in the compressed air from reaching the application equipment inside the booth

Oil Separator (by others)
Prevents oil in the compressed air from reaching the application equipment inside the booth

j10 - Unit Exterior

Bearing Access
Remove panel to access the blower bearing.

Flame Sight Glass
Viewing port to allow technician to see the ignition/pilot/burner flame.

Inlet Filter Access
The first stage of filtration is located behind this access door.

Fan/Motor Access
Open the door to access the blower motor, belts and bearing.

Main Control Panel
The first stage of filtration is located behind this access door.

j11 - Inlet/Discharge Damper

Belemo Actuator
Opens the inlet/discharge damper when the fans are started. There is a proving switch in the actuator to show the Carel controller that the damper is opened. The actuator is spring return so if it loses power, it will automatically close.

Damper
The damper can be located either on the inlet side or the discharge side of the AMU. The damper is intended to close off the ductwork when the unit is not running to prevent outdoor air from entering the area when the unit is not in use.