



START-UP PROCEDURE

INDIRECT-FIRED UNITS WITH TUBULAR HEAT EXCHANGERS & CAREL c.pCO SERIES DIRECT DIGITAL CONTROL

Start-up must be performed by a trained, experienced service person.

The following general start-up procedure applies directly to indirect fired heating systems. Please note any added options for a specific unit which may affect control sequence or terminal numbering prior to attempting start-up or service work. Read entire start-up procedure and review all reference material (Unit Specifications, Gas Train/Burner Specifications, Sequence of Operation, Parts Lists, and Electrical Schematic) supplied with each unit.

STEP 1

Set remote Auto-Off-On switch (SW-2) to "Off" position. Turn off incoming electrical power and gas supply to unit. Electrical power can be turned off at unit disconnect. Gas supply shut-off is at the inlet of unit's gas manifold.

STEP 2

Verify that incoming electrical and gas supply match name plate requirements (i.e., voltage/amp capacity, gas pressure and volume capacities, etc). If they do not, stop at this point and contact Titan Air.

STEP 3

Open access doors to blower and control vestibule sections. Check all electrical connections and hardware (blower drives, bearings, damper linkages, etc.) for tightness and correct field wiring connections.

STEP 4

Check that all gas, pilot, vent, and pressure sensing lines are properly connected and unobstructed. Verify incoming gas line was "blown out" to flush out debris prior to connecting gas line to unit. Also verify incoming gas line has been purged of air up to unit's gas inlet.

STEP 5

At manifold pressure test port, downstream of modulating gas valve, connect a gas pressure gauge capable of reading a few inches of water column. If unfamiliar with the user interface, take time to review sequence of operation which includes a description of multiple screens available on GD-1.

STEP 6

Turn on incoming electrical power at unit disconnect. Confirm that remote user interface (GD-1) powers up and that all sensor readings are reasonably accurate. Set HVAC Mode to off. Turn Auto-Off-On switch to auto position. Make sure blower access door is securely held open. Turn blower service switch (SW-5) on.

STEP 7

If an optional intake or discharge damper is installed, blower may not start until damper motor's internal "proof open" end switch closes (damper motor and end switch wiring are generally completed in the field after damper is mounted). If an intake or discharge damper proof-open end switch is not included, blower should start immediately. Check blower for proper rotation direction. If rotation is reversed, turn both service switch and disconnect switch off. For 3 phase motors, reverse any two leads



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going to the motor. For single phase motors, see instructions on the motor.

STEP 8

With proper blower rotation verified, check and record RPM of blower. RPM of blower should only be increased or decreased if unit is not delivering rated CFM. Contact Titan Air before attempting to change CFM capacity of unit.

STEP 9

Enabling associated exhaust or opening an overhead door may be necessary to keep from over pressurizing the building. If assistance is needed, contact Titan Air.

STEP 10

Start unit with SW-5. Check and record motor amp draw. If motor amp draw exceeds listed Full Load Amps (FLA), stop and contact factory.

STEP 11

Turn unit off. Check gas line for proper and tight connections with no leaks.

STEP 12

Turn on main gas valve. If unit is equipped with a low gas pressure switch (P-2), reset to on position.

STEP 13

Start unit with SW-5 and adjust setpoints to enable burner.

STEP 14

Unit should go through its complete burner ignition sequence. On new installations, resetting flame safeguard may be required to purge air from gas line. If unit does not cycle through its burner ignition sequence after a few attempts, refer to the service information in following section for troubleshooting instructions.

STEP 15

On the flame safety are 2 microamp test ports. Use microamp meter to test flame signal strength. For modulating or two stage burners, flame signal strength should be checked at low fire and high fire. Flamesafeguard requires at least 0.7 microamps, but typical values range from 2 to 4 microamps.

STEP 16

Low fire manifold pressure was set at the factory and should only need to be verified. Refer to separate pages in this manual for low fire manifold pressures and adjustment diagrams. Modulating valve adjustments and two stage valve adjustments are depicted on separate pages. For either modulating or two stage burners, adjust temperature setpoints to allow low fire operation. *Low fire should provide a continuous flame maintaining a stable signal near the upper end of acceptable microamp range.*

STEP 17

At main low voltage terminal strip, carefully remove discharge temperature sensor wires. Insert the 1070 ohm test resistor in place of discharge temperature sensor. This will simulate a temperature of approximately 70 degrees. Increase temperature setpoint to maximum. This will force modulating valve to a sustained high fire position and bring on additional stages if applicable. Check the high fire manifold pressure for each burner. Manifold pressure should be compared to burner's rated manifold pressure. If the total is higher or lower than rated pressure, adjustment can be made at gas pressure regulator. Do not set total manifold pressure over name plate rating.



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STEP 18

With burner on high fire, turn high temperature limit (TL-1) to its lowest setting. The limit should trip out and shut down burner. Turn TL-1 back to factory setting of 185 deg. F and reset control.

STEP 19

Remove test resistor and re-connect sensor wiring.

STEP 20

With all wiring in place and unit operating in "HEAT" mode, adjust room or supply temperature (depending on type of temperature control) setpoint and observe modulation of burner.

For room temperature control with reset of discharge temperature setpoint and limited building internal heat gain, it is suggested that maximum discharge temperature be set at approximately 95°F to 110°F and minimum discharge temperature be set at or slightly above desired room temperature (offset of 0°F to +10°F). For buildings with a higher internal heat gain, minimum discharge temperature offset will need to be negative number to prevent overheating the space during mild weather.

STEP 21

Cycle burner(s) and verify that each burner fully lights within a few seconds.

STEP 22

Low temperature safety function is built into the c.pCO controller. To test this function, increase low temperature safety setpoint above discharge temperature. If outside air temp is high, remove discharge sensor wires and replace with a 1070 ohm resistor. Unit should shut down after adjustable timer setting has "timed-out". Remove test resistor and replace sensor wires if applicable. Press and hold alarm key on GD-1 for 3 seconds to reset the fault.

STEP 23

With unit operating and burner on, close a manual gas shutoff valve to a burner. Burner should shut down in a few seconds with alarm condition indicated on flame safeguard after retry attempts fail. If left in this condition, unit will eventually shut down and indicate a fault. Open hand valve and reset flame safeguard.

STEP 24

Turn service switch(es) and disconnect off. Verify that all terminals, electrical connections, and hardware (bearings, sheaves, blower wheels, etc.) are securely tightened. Adjust all controls to desired settings. Remove all gauges, meters, and hand tools from the unit. Replace all covers on controls. Make sure all safety devices are reset.

STEP 25

Turn disconnect on. Start unit from remote panel. Set all user interface modes and setpoints as desired. Verify proper unit operation in all modes according to unit's sequence of operation.

Unit should be ready for operation. To assure long lasting and efficient operation of Titan equipment, a regular service inspection should be set up. Refer to the maintenance section at back of this manual for detailed maintenance information.

BELIMO ACTUATOR COUPLED WITH MODULATING VALVE



Low Fire Position

Low Fire Adjustment: Disconnect wire at terminal #1 on actuator. Press “clutch” to manually rotate shaft as needed. Adjust mechanical stop at counterclockwise end of actuator’s stroke to set low fire.

High Fire Adjustment: Adjust high fire at separate regulator. Do NOT adjust mechanical stop at clockwise end of actuator’s stroke. Refer to detailed instructions in start-up procedure.



High Fire Position

Actuator Replacement/Installation: Installation of a replacement actuator should be made with actuator rotated to high fire position. Clockwise high fire mechanical stop should be set and modulating valve stem should be parallel with pipe as shown in “High Fire Position” photo above.

Low fire mechanical stop can initially be set similar to original actuator. Adjust low fire per start-up procedure.

Figure 1