



START-UP PROCEDURE

100% OUTSIDE AIR MAKE-UP UNITS WITH DISCHARGE TEMPERATURE CONTROL & c.pCO DIRECT DIGITAL CONTROL MODULE

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

The following general start-up procedure applies directly to 100% OA air make-up units. Please note any added options for a specific unit which may affect the control sequence or terminal numbering prior to attempting start-up or service work. Read the 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

Turn off incoming electrical power and gas supply. Disconnect electrical power at the unit disconnect. Shut off gas supply at inlet to unit's gas manifold.

STEP 2

Verify that incoming electrical and gas supply match the 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 the 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 that the incoming gas line was "blown out" to flush out debris prior to connecting gas line to unit. Also verify that incoming gas line has been purged of air up to unit's gas inlet.

STEP 5

At the manifold pressure test port, downstream of the modulating gas valve (VM-1), connect a gas pressure gauge (pressure gauge must read inches of water column to 10" with the capability of reading a negative pressure).

STEP 6

Turn on incoming electrical power at unit disconnect. Verify that the digital user interface powers up and confirm that main screen and input screen sensor readings are valid. Referring to the sequence of operation, set the blower mode to auto (SW-2) and ensure that no external interlocks are calling for the unit to operate. Set the HVAC mode to fan-only (no heat).

STEP 7

Make sure the blower access door is securely held open. Start the unit in the summer mode by placing the service switch (SW-5) in the on position.



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STEP 8

If an optional intake or discharge damper is installed, the blower will not start until the 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 is not installed, the blower should start immediately. Check the blower for proper rotation direction. If the rotation is reversed, turn both the service switch and the disconnect switch off. For 3 phase motors, reverse any two leads. For single phase motors, see instructions on the motor.

STEP 9

With proper blower rotation verified, check and record the RPM of the blower. If the blower speed has to be either decreased or increased (to achieve the rated CFM of the unit), adjust the motor sheave to desired setting.

STEP 10

Turn the unit off. Close and latch the blower access door.

STEP 11

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

STEP 12

Check and record the negative pressure reading on your burner manifold pressure gauge. This measurement is necessary for proper setting of the burner manifold pressure when the unit is put in high fire mode. At this time, also measure the pressure drop across the airflow switch ports (remove cap from plastic tees and connect tubes to tee fittings). This measurement can be used as a simple indication of proper airflow through the unit. If this second measurement is not between 0.7" w.c. and 0.5" w.c., the blower speed may need to be adjusted. If assistance in taking or interpreting these measurements is needed, contact Titan Air.

STEP 13

Turn the unit off. Check the pilot gas line for proper and tight connections with no leaks. For shipping purposes, the pilot lines are disconnected.

STEP 14

Turn on the main gas valve, slowly open the manual pilot gas valve. If the unit is supplied with a low gas pressure switch (P-2), reset to on position.

STEP 15

Place the run-check switch (located on flame safeguard programmer module) to the check position. This will allow the pilot to light without lighting the main burner. Start unit with SW-5 and enable the burner with the burner service switch (SW-6).

Note the burner should not be operated continuously in the check position for more than 1 minute because the ignition transformer is not rated for continuous duty.

STEP 16

The unit should go through its complete burner ignition sequence with only the pilot ignited. The sequence can be observed by following the indicating LED's on the flame safeguard. On new installations, resetting of the flame safeguard may be required to purge air from the pilot line. If the unit does not cycle through its burner ignition sequence after a few attempts, refer to the service information in the following section for troubleshooting instructions.



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STEP 17

In the center of FS-1 are 2 voltmeter test ports. Set the volt-ohm meter to approximately 30 VDC scale and insert the meter leads into the test ports (common lead in black port, positive lead in red port).

STEP 18

With only the pilot operating, record the DC volt signal. The DCV range is noted on the amplifier module of the controller (FS-1). There should be a steady DCV signal on the upper range stated on the controller.

STEP 19

Once stable pilot is achieved, shut unit down and place the run-check switch in the run position. Wire the 1000 ohm test resistor in place of the discharge sensor (this will simulate approximately 70°F discharge temperature). Adjust discharge air temperature set point to 50°F. This will force the burner into low fire. Start unit allowing it to operate in low fire. Make sure low fire flame is contained within the burner casting and extends the full length of the burner with no breaks in the flame AND the flame sensing signal at the flame safeguard remains stable. Check and record DC voltage as in step 18. If required, low fire can be adjusted with the actuator's mechanical stop at the counter clockwise end of the actuator's stroke.

STEP 20

Once stable pilot and low fire are achieved (with test resistor in place of the discharge temperature sensor) check the discharge temperature reading on the digital control panel (default display - see sequence of operation), it should indicate approximately 70°F. Adjust the discharge temperature set point to 95°F. This will force the burner into high fire. Start the unit, turn SW-5 & SW-6 on. Once the burner is operating, check the manifold pressure. The reading on your manifold pressure gauge needs to be added to the negative pressure recorded in step 12. The resulting total manifold pressure should be compared to the unit's rated manifold pressure. If the total is higher or lower than the rated pressure, adjustment can be made at the gas pressure regulator (GP-1). Do not set the total manifold pressure over 5.5" w.c. for natural gas.

Note that the modulating valve actuator rotation is mechanically and electronically limited. Do NOT change this maximum rotation limit.

Because of possible variations in the BTU content of gas, it may be necessary to set the manifold pressure to the rated temperature rise (temperature difference between the incoming air and the unit discharge air). Again, note the maximum manifold pressure settings noted at the end of the preceding paragraph.

The high fire flame should be visually observed to verify proper combustion. Experienced service personnel should be able to assess the appearance of a proper high fire flame. If assistance is needed, contact the factory.

STEP 21

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



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The next step is to check the operation of the Low Temperature Safety function internal to the DDC module. Wire the 1000 ohm and 10K ohm test resistors in parallel and in place of the discharge sensor to achieve a simulated discharge temperature reading of approximately 50°F. Adjust the low temperature safety (LTS) setpoint above the simulated discharge temperature reading. After the set amount of time operating at this simulated discharge temperature, the unit should shut down on low temperature safety alarm. See the sequence of operation for details on the alarm indication and steps to reset the alarm. Note that it may be necessary to manually throttle or cut the gas flow during this step to prevent overheating or cooling the served space. Remove the test resistors and re-install the discharge temperature sensor wires. Set the LTS setpoint back down to the desired setting.

STEP 23

With the unit again running normally, turn off the 2nd manual gas shutoff valve GT-3. The burner should shut down in a few seconds (look for flame LED to go out on FS-1) with the unit shutting down in 30 seconds or less. Open GT-3 and reset FS-1 by pressing button protruding through cover.

STEP 24

Open the test ports for the airflow switch (P-1) and verify that burner will not operate without proper pressure differential sensed at P-1. Replace the test port covers.

STEP 25

Turn the disconnect off. Remove test resistors and store in unit for future use. Re-connect discharge temperature sensor wiring. Verify 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 26

Turn the disconnect on. Set the HVAC mode to auto and discharge temperature setpoint to desired setting. Start the unit from the remote panel (refer to sequence of operation and control panel symbol description).

Observe modulation of the burner. If the burner does not modulate, contact Titan Air for troubleshooting assistance. Verify proper operation according to unit's sequence of operation.

Be sure to check any optional controls (listed on Unit Specification and/or Sequence of Operation) which are not covered in this start-up procedure.

STEP 27

Verify that unit is interlocked with appropriate exhaust or that some sort of building relief vents are installed to prevent the unit from overpressurizing the building.

The 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 the back of this manual for detailed maintenance information.

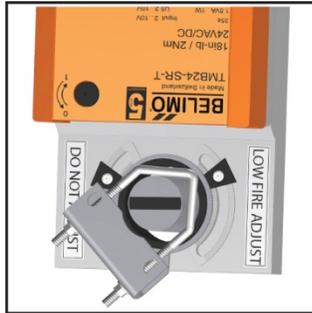
Figure 1

BELIMO ACTUATOR COUPLED WITH MODULATING VALVE



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. Need continuous flame across burner AND strong amplified signal at flame safeguard test ports.



High Fire Adjustment:

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

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 line mark on modulating valve stem should be parallel with pipe as shown in “High Fire Position” photo above. Set low fire mechanical stop similar to original actuator. Adjust low fire per start-up procedure.