



# **SFA Operating and Maintenance Manual**

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# **SFA Operating and Maintenance Manual**

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# SFA OPERATING AND MAINTENANCE MANUAL

## GENERAL DESCRIPTION

The Spring Air Systems Inc. SFA unit is a commercial ventilation unit. The SFA units are available in sizes ranging from 500 CFM to 10,000 CFM.

The SFA unit is constructed specifically for commercial kitchen applications. The unit is available in the following arrangements.

SFA-OV	Vertical arrangement no heating
SFA-OH	Horizontal arrangement no heating
SFA-IGO	Horizontal arrangement with heating
SFA-IGODX	Horizontal arrangement with heating and DX air conditioning package
SFA-OHSE	Horizontal arrangement with supply and exhaust fans

## SFA-OV & SFA-OH

The SFA-V and SFA-H brings unheated air into a commercial kitchen for discharge into a compensating kitchen exhaust hood or directly into a kitchen that does not require conditioned air. The unit is complete with motorized damper and end switch located in the fresh air inlet of the SFA-H and supply air discharge on the SFA-V.

## SFA-IGO

The SFA-IGO unit brings heated air into a commercial kitchen. The unit is complete with motorized damper and end switch located in the fresh air inlet, indirect gas fired gravity (or power) vent burner, with stainless steel exchanger and burner complete with intermittent-duty pilot ignition gas controls for use with natural gas, non-lockup type. Controls to include modulator/regulator valve, combination main/pilot/manual valve, spark ignition controller, overheat control and low voltage transformer. duct heater. The unit is available with two gas control options.

- Mechanical Burner Control
  - Mechanical modulating control system with duct sensing mounted in unit discharge by Spring Air Systems. Local set point adjustment located in the burner control panel.
- Modulating Burner Control
  - Electronic modulation control with maxitrol duct sensing system with local set point adjustment located in burner control panel. The ductstat is normally installed in the heater discharge duct by mechanical contractor.
  - Summer/Winter Operation
  - The SFA burner is controlled by either a summer/winter switch located in the remote panel or a unit mounted ambient stat set at 65 F. located in the inlet of the SFA unit. When the outside temperature falls below 65 F the burner circuit is shut off.

## **SFA-IGODX**

The SFA-IGOs unit brings both heated air conditioned air into a commercial kitchen. The heated air conditioned air is directed to kitchen ceiling diffusers or into the makeup air plenum of the Spring Air Systems exhaust hood.

The unit is complete with direct expansion cooling coil, compressor condenser section with one or two compressors with cylinder unloading, and a two or three stage discharge stat. The unit comes completely prepipe and charged.

The unit also includes a motorized damper and end switch located in the fresh air inlet, indirect gas fired gravity (or power) vent burner, with stainless steel exchanger and burner complete with intermittent-duty pilot ignition gas controls for use with natural gas, non-lockup type. Controls to include modulator/regulator valve, combination main/pilot/manual valve, spark ignition controller, overheat control and low voltage transformer. duct heater The unit is available with two gas control options.

- Mechanical Burner Control
  - Mechanical modulating control system with duct sensing mounted in unit discharge by Spring Air Systems. Local set point adjustment located in the burner control panel.
- Modulating Burner Control
  - Electronic modulation control with maxitrol duct sensing system with local set point adjustment located in burner control panel. The ductstat is normally installed in the heater discharge duct by mechanical contractor.
  - Summer/Winter Operation
  - The SFA burner is controlled by either a summer/winter switch located in the remote panel or a unit mounted ambient stat set at 65 F. located in the inlet of the SFA unit. When the outside temperature falls below 65 F the burner circuit is shut off.

## **Summer/Winter Operation**

The SFA burner and air conditioning is controlled by either a summer/winter switch located in the remote RPD-P panel or a unit mounted ambient stat set at 65 F. located in the inlet of the SFA unit. When the outside temperature falls below 65 F the burner circuit is shut off.

## **SFA-OHSE**

The SFA-OHSE unit brings both heated and unheated air into a commercial kitchen. The heated air is directed to kitchen ceiling through a two way adjustable diffuser out the front of the Spring Air Systems hood and the unheated air is directed to the compensating section of the hood.

The unit is complete with motorized damper and end switch located in the fresh air inlet, supply fan, motor and drives, exhaust fan motor and drives, electric heating coil, motor starters, disconnect switch, supply air filters, exhaust air gravity backdraft damper, and remote control station.

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## SEQUENCE OF OPERATION

### SFA-IGO, SFA-IGODX and SFA-ES

Power is supplied to the motorized damper in the SFA unit. Once the damper has opened the end switch closes sending 120V/1/60 power to the supply fan starter. The SFA-IGO and SFA-IGODX burner circuits are also energized. Refer to the indirect gas fired burner manual for more detailed description of the heater operation.

#### Summer/Winter Operation

The SFA burner and/or air conditioning is controlled by either a summer/winter switch located in the remote RPD-P, panel or an ambient stat located in the fresh air discharge.

#### Ambientstat

The burner circuit is activated when the outside temperature is below 65 F. When there is a call for heat from the ductstat the gas control valve increased gas flow to the burner to increase the temperature rise until the discharge temperature stat is satisfied.

Should the outside air temperature rise above 65 F the burner circuit is automatically shut off and the DX air conditioning circuit is activated.

#### Summer/Winter Switch

The switch is located on the remote RPD-P panel. The heater operates continuously on minimum fire when the switch is in the Winter position. When there is a call for heat from the ductstat the gas control valve increased gas flow to the burner to increase the temperature rise until the discharge temperature stat is satisfied.

When the switch is in the Summer position the burner circuit is shut off and the DX air conditioning circuit is energized.

When power is shut off to the motorized damper the damper closes, the supply fan and burner circuit shuts off.

### SFA-V and SFA-H

Power is supplied to the motorized damper in the SFA unit. Once the damper has opened the end switch closes sending 120V/1/60 power to the supply fan starter.

When power is shut off to the motorized damper the damper closes, the supply fan shuts off.

### Prefabricated Roof Curbs

#### Typical SFA-OHSE curb

The curb is installed on the roof of the structure first. A hole is cut to match the inside dimensions of the curb and curb is set on top of this hole. The curb should be securely fastened to the roof structure around the bottom perimeter flange. The connection should be sealed water tight.

Now the hood must be installed in the structure. The hood is designed to be attached to the back wall of the structure. First the hood must be secured to the structure via hanging rods (or mounting brackets or shelf type hood). Make sure the duct openings of the hood line up with the curb duct openings above.

Once the hood is in place insert the duct extension(s) in to duct openings on the curb. Check that the ducts extend into the top of the duct collars of the hood below. A silicone sealant should be added to the perimeter of the duct extension support on the curb before the extensions are allowed to seat into the hole. Secure the duct extensions to the curb and the hood duct collar with sheet metal screws.

Apply the same silicone sealant to the top outside perimeter of the curb and set the complete SFA unit on the curb. The unit weight should be enough to hold the unit firmly on the curb. If the complete assembly is to be transported, the SFA unit should be fastened to the curb with 1/8 nuts and bolts every 24 inches around the perimeter.

## RECEIVING, HANDLING AND STORAGE

Spring Air System units have been carefully inspected before leaving the factory. When the unit is received, an on-site inspection should be made. The unit is factory balanced, all components (centrifugal wheel, shaft, bearings, etc.) have been tested prior to shipment. Units which are mishandled can void the warranty provisions. If units have been damaged in transit, it is the responsibility of the receiver to make all claims against the carrier. Spring Air Systems is not responsible for damage incurred during shipment. Units should be handled with care to avoid possible damage. Severe jarring and/or dropping should be avoided. Units which are supplied with special painted or coated finishes should be handled with care to protect the surfaces. If continuity of the coating is scratched and damaged due to mishandling, the protective coating may be adversely affected. Long term storage requires special attention. All units should be stored on a level, solid surface (preferably indoors). If outside storage is necessary, protection against moisture and dirt should be provided. All bearings and shafts should be protected with lubricant and the entire unit should be encased in plastic or wrapped in some similar weather-proof material. To prevent deterioration of lubricants, special finishes, etc., periodic inspection should be made. During these inspections, it is good practice to rotate the centrifugal wheel by hand to spread bearing lubrication. It is advisable to remove V-belts if units are to be stored for an extended period of time. V-belts which remain under tension in a stationary position for extended periods are likely to have reduced operating life.

## INSTALLATION

**Roof mounting:** Normally power is brought up from within the structure through proper conduit lines and placed inside one corner of the curb. It is then fed through the clearance hole provided and in turn fed through the unit to the (disconnect switch if furnished and) motor.

**Wall Mounting:** Normally, power is brought up from within the building through proper conduit lines to the wall opening. It is then fed to the (disconnect switch if furnished and) motor.

**ANCHORING AND SECURING THE VENTILATOR: Roof Mounting- Whenever possible,** anchoring should be accomplished by fastening through the vertical portion of the mounting flange. The type, size and number of fasteners depends upon the unit size and curb construction. If fastening is prescribed by code or specification to be done through the top(horizontal portion) of mounting flange, then neoprene or lead washers should be used under the head of each fastener. Large units installed in areas subject to high winds or unusual field conditions may require additional fastening with guy wires. If the contractor removes any ventilator parts they should be reassembled by replacing all spacers, washers, nuts, bolts, fasteners and components exactly as they were found prior to removal. All fasteners are to be drawn tight and secure.

## START UP AND OPERATION

Careful inspection should be made before start-up. All motor bearings should be properly lubricated, all fasteners should be securely tightened. Centrifugal wheel should be rotated by hand to insure free movement. (NOTE: Before placing hand on centrifugal wheel, or V-belts, lock out primary and secondary power source.) Check all set-screws and keys. Tighten where necessary. The condition of V-belts and the amount of belt tension should be checked prior to start-up. When it becomes necessary to adjust belt tension, do not over-tighten as bearing damage will occur. Recommended belt tension should permit one-half inch (1/2") deflection of the belt on each side of the belt measured halfway between the pulley centerline. Extreme care must be exercised when adjusting V-belts as not to misalign the pulleys. Any misalignment will cause a sharp reduction in belt life and will also produce squeaky, annoying noises. On units equipped with two or three groove pulleys, adjustments must be made so that there is equal tension on all belts

**WARNING:** Whenever belts are removed or installed, never force belts over pulleys without loosening motor first to relieve belt tension. The inlets and approaches to the exhaust should be free from obstructions. To assure maximum air movement, adequate supply air must be available. Power lines compatible with the motor requirements are brought up from an electrical source to the unit. A generous amount of slack in power lines should be provided to allow for motor deflections and to permit movement of motor for belt-tension adjustments. Motor must be securely and adequately grounded. Protect power lines from sharp objects. Do not kink power line or permit it to contact hot surfaces, chemicals, grease or oil. Before putting any unit into operation, the following check list should also be completed:

1. Lock out primary and secondary power source.
2. Make sure installation is in accordance with manufacture's instructions.
3. Check and tighten all fasteners
4. Spin centrifugal wheels to see if rotation is free and does not rub or bind.
5. Check all set-screws and keys and tighten if necessary
6. Check V-belt or Direct-Drive coupling for alignment (use recommended belt tension).
7. Check V-belt for proper sheave selection to make sure they are not in reverse position.
8. Make sure there is no foreign loose material in duct work leading to and from the fan or in the fan itself.
9. Secure all access doors to fan and duct work.
10. Check line voltage with motor nameplate.
11. Check wiring and tighten all terminals

(NOTE: on single phase motors the terminal block must be set up in accordance with the name plate instructions and/or wiring diagram. The set-up must match the line voltage. IF the motor is 3 phase, the winding leads must be grouped and connected as shown on the wiring diagram. The line voltage must correspond with proper grouping of motor leads. On 2 speed motors, the wiring diagram must be followed explicitly or serious motor damage will occur.)

The SFA has been checked at the factory prior to shipment for mechanical noises. If mechanical noises should develop then some suggestions are offered here as a guide toward remedying the cause.

1. Check rotating members for adequate clearance
2. Check proper belt tension and pulley alignment.
3. Check fan bearings.

If motor starter overloads elements are tripping out, the following items should be investigated:

1. Is the heater element the correct size for the motor?
2. Is the starter located in a high ambient temperature?
3. Is the centrifugal wheel rotating in the right direction?
4. Is the line voltage excessively low?
5. Is the motor wired properly to suit the line voltage?

Switch on the main disconnect and fan on/off switches on the remote panel and allow fans to reach full speed.

Check carefully for:

1. Correct rotation of the centrifugal wheel. NOTE: incorrect rotation overloads motor severely and results in serious motor damage. To change rotation of phase 3 units, simply interchange any 2 of the 3 line leads. On single phase units, change the terminal block set up following the wiring diagram.)
2. Check motors and bearing temperatures so they are not excessively hot. (NOTE: use care when touching the exterior of an operating motor. Modern motors normally run hot. They are designed to operate at higher temperatures. This is a normal condition, but they may be hot enough to be painful or injurious to the touch.) If any problem is indicated, SWITCH OFF IMMEDIATELY. Lock out the electrical supply and check carefully for the cause of the trouble and correct as needed. Even if the fan appears to be operating satisfactorily, shut down after a brief period and check all fasteners, set-screws and keys for tightness. The fan may now be put into operation, but during the first eight (8) hours of running, it should be periodically observed and checked for excessive vibration or noise. At this time, checks should also be made of motor input current and motor bearing temperatures to insure they do not exceed manufacture's recommendations.

After eight hours of satisfactory operation, the fan should be shut down and the electrical power locked out to check the following items and adjust if necessary:

1. All set-screws, keys and fasteners.
2. Drive coupling alignment.
3. V-belt alignment.
4. V-belt tension.

## MAINTENANCE

Do not attempt any maintenance on a SFA unit unless the electrical supply has been completely disconnected. If a disconnect switch has not been provided, remove all fuses from the circuit and lock the fuse panel so that they cannot be accidentally replaced.

### FANS:

Lubrication is a primary maintenance responsibility. All bearings should be checked periodically. V-belts also should be inspected for tightness. If the fan is installed in a corrosive or dirty atmosphere, the centrifugal wheel, inlet and other moving parts should be cleaned periodically. FAN SHAFT LUBRICATION: Fan shaft bearing pillow blocks are furnished in either the pre-lubricated sealed-for-life type or the greaseable type depending on what was ordered. Here again, the pre-lubricated type requires no servicing for 7 to 10 years of normal use, and the greaseable type are factory greased eliminating the need for greasing initially. Whenever grease is required, depending on the lubricating schedule, it should be applied while the shaft is rotating. This practice should not supersede any safety considerations.

**IMPORTANT:** Use low pressure grease guns only. High pressure guns tend to blow out or unset bearing seals, leaving the bearing open to collect grime, dust and foreign particles.

### RECOMMENDED LUBRICANTS

MANUFACTURER	PRODUCT NAME	TEMP. RANGE
Texas company	(Regal Starfak #32)	-32 F to +200 F
Socony Mobil Oil Co.	(Mobil BRB Lifetime)	-67 F to +250 F
Shell Oil Co.	(Nerita #2)	-67 F to +250 F

### LUBRICATION SCHEDULE:

1. Under average conditions where ambient temperatures do not exceed 120 F., lubrication is required once or twice a year.
2. Under a dirt laden atmosphere where there is a temperature range of 10 F. to 120 F., lubrication is required from 3 to 6 times a year.
3. Under extreme temperature conditions and extremely dirty atmospheres, lubrication should be scheduled at least once or twice a month.

### MOTOR LUBRICATION:

In general, standard motors are furnished at pre-lubricated sealed-for-life ball bearings which require no lubrication for 7 to 10 years of normal service. In cases where motors have been ordered with greaseable bearings, these bearings have been lubricated at the factory and do not require any attention for 1 year under normal conditions. If the particular motor is equipped with grease relief fittings, these should be removed to allow grease to flow out when maintenance is performed. Whenever possible, grease should be applied while the motor is running. This practice should not supersede any safety considerations. **DO NOT OVER-GREASE-** as most lubricants deteriorate motor windings, thereby reducing motor life.

### NOTE

1. When a unit is being started for the first time, a complete inspection of the duct work and interior of the unit should be made (with the power locked off) , to make certain there is no foreign materials which can be sucked into or blown through the duct work. :

**PARTS REPLACEMENT:** If replacing parts, do so with properly selected components which duplicate the original parts correctly. Incorrectly sized shafts, belts ,pulleys, centrifugal wheels, etc., can damage the fan.

## MAINTENANCE SCHEDULE

### Every Four Weeks

1. Inspect the prefilters. Replace if necessary. It is important to maintain clean prefilters. Replacing the inexpensive prefilters will extend the life of all other filters (where applicable).

### Every Six Months

1. Complete the four week check list.
2. Inspect the supply and exhaust fan belts for correct tension and wear. Adjust if necessary.
3. Inspect all electrical connections. Tighten if necessary.
4. Inspect the supply air and exhaust air damper operation. Clean the exhaust air damper as necessary by removing excess grease build-up.
5. Inspect the operation of the electric heater. Adjust ductstat to turn on all three stages.

### Every Year

1. Complete the four week and six month check list.
2. **Units with CO2 monitors:** Inspect the base board heater located in the supply air fan compartment. Adjust the base board heater thermostat to check operation. The heater is normally set at 35 F.
3. Inspect the remote panel for burned out light bulbs. Replace as necessary.
4. Replace the V-belts on the supply and exhaust fans.

### V-Belt Drives

ALWAYS KEEP A SPARE SET OF BELTS. Periodically check the belt tension and adjust if necessary. Some slack should be left in the belts, typically 1/4 inch per foot from the fan to the motor. Always replace the complete set of belts to ensure proper and even wear. When replacing belts loosen the motor mounts. Do not force the belts over the sheaves.

### Fuses:

Keep a set of spare fuses in case of an emergency. If fuses continue to blow contact a qualified service technician.

<b>For Service call:</b>	<b>Lone Star Industries</b>	<b>(604) 888-9561</b>
	<b>Spring Air Systems</b>	<b>(905) 338-2999</b>
	<b>Dumur Industries</b>	<b>(306) 757-2403</b>

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