

## UP Series Total Air System - TAS

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Point of Manufacture – Campbellsville, KY, USA

SSR® UP6-5, 7.5, 10, & 15c TAS

### 60 Hz DETAIL DESCRIPTION

#### PACKAGE

The “**Total-Air-System**” (TAS) is a unique compressor package, comprising a fully integrated rotary screw compressor with a high efficiency, cycling, air dryer, general purpose and high efficiency air filters. This is all mounted on to a horizontal air storage receiver. The TAS package occupies less space, costs less to install, and delivers high quality compressed air to maximize operating efficiency and reduce costs.

#### PACKAGE PRE-FILTER

The cooling and intake airflow is pre-filtered through an easy to service electrostatic filter panel, which protects the dryer and main cooler matrix from heavy dirt ingress thus reducing maintenance requirements.

#### INTAKE AIR FILTER

The compressor intake air filtration for UP Series is accomplished through the use of a dry-type air cleaner, which is 99.9% efficient at 3 microns and above.

#### AIREND

Since the airend is the fundamental component in a rotary screw compressor package, reliability, performance and efficiency are determined by selection of the most effective design, maintenance of close manufacturing tolerances, and precise assembly of the airend itself. All UP Series units,

apply proven airends achieving high levels of efficiency and durability.

A high efficiency asymmetrical profile is developed through a unique two-step machining process. The first stage develops the basic wrap angle profile and is a rough-cut. The final stage is a finish grinding process, which ensures a hard, true rotor surface. The rotor shafts are precision ground to tolerances within 12 microns (0.0005 of an inch). The rotor housings are made of high quality, close grain cast iron.

Bearing configuration used on all Small UP Series models is the tapered rollers thrust bearing and parallel roller journal bearing. These roller bearings are able to handle all loads, radial, thrust or a combination of both. With this bearing configuration, the discharge end of the male and female rotors are each equipped with a pair of tapered roller bearings offset at opposing axis for maximum positional stability and absorption of thrust and radial loads. The thrust bearing housing is made of a close grain cast iron.

Cylindrical roller bearings are used to carry the radial loads on the inlet end of the rotors. All bearings, whether thrust or radial, are premium specification, which provide truer, harder running surfaces for both inner and outer bearing races. A double shaft seal is fitted on the main input shaft.

Coolant dams are machined at the bearing locations. This provides an area for coolant to accumulate when the compressor is shut off. Upon start-up the bearings, which are resting in coolant retained by the coolant dam is immediately lubricated, thereby assuring long life.

#### COOLANT RESERVOIR

A pre-separator is fully integrated with the airend forming a single module. The highly efficient separation system, combined with suitably sized sump volumes, provides for normal coolant top-up intervals of 500 hours. A pressure relief valve mounted on the housing protects the package. The coolant filler, is designed to prevent overfill the compressor, and a visual coolant level indicator is located on the side of the module. A drain point is provided at the bottom of the sump.

#### MAIN DRIVE MOTOR-GENERAL

The main drive motor is matched to the requirements of the torque and the load of the compressor and to specific design criteria that enable the motor to develop peak efficiency and power factor at full load.

Double shaft construction with the cooling blower mounted on main shaft provides assured cooling.

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#### MOTOR FRAME

Standard NEMA frame, 2 pole, E-pact efficiency rated, open-drip proof, three-phase motors are used for UP6 - 5, 7.5, 10 & 15 hp 60Hz applications.. Single-phase motors are also available up to 7.5 hp. TEFC motors are available as an option.

#### ELECTRICAL DESIGN

Speed, torque and operating characteristics have been designed to match the load of the compressor. Motor efficiency and power factor have been optimized for each size over the entire capacity range of the UP6 - 5, 7.5, 10 & 15 hp. Standard motors are 230/460v 3 Phase 60 cycle and 200, 380, & 575 volt 3 phase motors are available as options. Single-phase motors are optional at 5 & 7.5 hp duties 200 & 230 volt 60Hz.

#### MOTOR BEARINGS

Ball bearings for the drive and non-drive end provide dependable and reliable service both front and back bearings are permanently lubricated.

#### MOTOR INSULATION

The selected motor has a minimum of class F insulation as standard, and is specified to operate in ambient conditions up to 104°F (40°C). In addition the motor is specified to operate at maximum load with a temperature rise some 27°F (15°C) below that permitted by the design code. This conservatism is frequently

referred to as “Class F with class B temperature rise”.

#### BELT DRIVE

The power transmission from the drive motor to the airend male rotor is by long life non-stretching poly-vee belt with easy to adjust belt tension control and simple access for maintenance. This assures performance integrity and belt life. The complete drive system is contained within a protective guarding.

#### COOLING SYSTEM

##### Coolant Filtration

The full capacity coolant filter is a high capacity 5-micron, replaceable spin-on element with pressure bypass.

##### Coolant / Lubricant Temperature Control

A thermostatic control valve is mounted downstream of the oil cooler. The temperature sensitive element controls the flow of coolant through the oil cooler. This provides the proper injection temperature and assures fast warm-up.

##### Coolant Injection

The coolant is injected through ports near the airend inlet and directed back toward the inlet cover. This ensures the best possible pre-sealing of the rotors, and an optimum mix of coolant with air. The differential pressure between the separator tank and the airend inlet induces coolant flow.

#### COOLANT / AIR SEPARATION

After compression and discharge from the airend, the air is heavily laden with coolant. A separator is used to remove the fluid from the air stream and does so with a three stage separation system. In the first stage, air and coolant mixture from the airend discharge directly enters the separator tank through a nozzle, which directs the mixture flow within the volume. This action forces heavier coolant particles to the periphery of the tank. These particles combine with the main liquid body in the sump. The airflow then passes through the cartridge coalescing element, which combines the second and third stage of separation. The separator cartridge is two-stage with reinforced construction. Coolant, which has collected at bottom of the cartridge is drawn back to the airend inlet through a scavenge system.

The compressed air then passes to the air-cooled aftercooler where coolant vapour carryover will be further removed as it is condensed and drained together with water condensate. On the SSR-UP 5-15 hp compressors, the carryover after the aftercooler is less than 5PPM (5 mg/m<sup>3</sup>.)

Due to the conservative sizing of the air passages and the separator cartridge, there is a minimal pressure drop. This reduces to a minimum, power

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required to move the air through the compressor system.

A combined minimum pressure / check valve regulates the air discharge from the separator. This ensures that when the unit unloaded sufficient pressure is maintained in the tank to propel the coolant through the system. SSR UP Series compressors are supplied with an inclusive factory fill of Ingersoll Rand Premium Compressor Coolant that provides extended operating life.

Ingersoll Rand Premium Compressor Coolant is a PAG synthetic lubricant, providing better cooling characteristics and a longer life than other synthetic lubricants. Condensate containing traces of the coolant fluid should be processed to meet local environmental requirements before disposal in an approved manner.

#### COOLERS

SSR UP Series compressors come with integrally mounted air-cooled combination heat exchanger that cools both the coolant and compressed air and is of tube and fin design. Constructed from aluminium, it is designed to operate in ambient temperatures from 35°F (2°C) up to 104°F (40°C). The after cooler cools the compressed air to 18°F (10°C) above ambient air temperature at 104°F (40°C) and 60% RH. Centrifugal cooling fan is mounted in an internal

segregated cooling compartment. Cooling air is forced across the cooler with even velocity over the full surface area of the cooler matrix.

The cooler assembly is accessed through a single opening, providing access to both sides of the cooler, for quick and effective cleaning.

#### PIPING

The compressor utilizes flexible SAE hoses with JIC fittings, rigid steel piping, Bundy weld tubing, flexible connectors and nylon tubing as appropriate to provide vibration free operation. SAE "O" Ring fittings are applied on all lubricant connections. Each compressor system, after manufacturing and assembly, will be 100% inspected and tested to provide a piping system with minimum potential for leaks, which is easy for maintenance.

#### COMPRESSED AIR FILTRATION

Two stages of filtration are standard within the **Total Air System**. These are selected to balance the load between two duty-matched filters with performance characteristic to share the load, reduce total pressure losses, operating costs and extend effective life.

A first filter removes particles down to 1 micron, and coalesced liquids to 0.6 mg/m<sup>3</sup> (0.5 ppm). This is followed by a High Efficiency filter, which removes particles down to 0.1

micron including coalesced liquids, providing a maximum remaining aerosol content of 0.01 mg/m<sup>3</sup> (0.01 ppm).

#### CYCLING REFRIGERATED AIR DRYER

Totally integrated within the package and using the same cooling air flow, as the compressor package. The refrigerant air dryer which cycles on and off with the compressor, uses a unique single high efficiency welded stainless steel plate heat exchanger to perform the multiple duties of pre-cooler, refrigerant evaporator, and compressed air re-heater. The environmentally sound R-134a refrigeration cycle utilizes a high efficiency "micro channel" condenser and thermal control is provided with a quick acting hot gas bypass. Condensed water is removed from the airflow directly after the evaporator part of the heat exchanger, by a high efficiency, external cyclone separator. This condensate is discharged by solenoid drain from a manifold in parallel with other drain points.

#### CONTROL PANEL – GENERAL

The SSR UP Series compressor includes a standard control module, which provides starting, stopping, capacity and pressure control, together with operating and safety control for the package.

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Operation of the compressor is very simple and user friendly. The instrument panel is mounted on the front of the compressor, directly above the starter for good visibility when either floor or receiver mounted. The control panel includes: - Run/Stop selector switch and reset button, "lock off" emergency stop button, pressure gauge, dryer condition indicator, running hour meter. Signal lights indicate: - power on (green), auto restart (amber).

#### COMPRESSOR/CAPACITY CONTROLS

As standard, SSR UP 5-15 hp is provided with automatic start / stop control with constant running control regulator, which allows the compressor to operate online / offline. In addition a simple to apply, range adjustable auxiliary control valve provides a constant running mode of operation and should be selected when load conditions require.

#### STARTER

Two input power supplies are facilitated into the starter enclosure for main motor and dryer operation. A transformer provides 120V 60 Hertz, fuse protected control voltage. Motor overload protection is designed and sized to match the specific characteristics of the motor. The single-phase dryer compressor is separately fuse protected

#### TEMPERATURE PROTECTION

Should the compressed air temperature exceed 228°F (109°C) at the airend discharge, a switch will shut down the compressor, and when provided with optional maintenance indicator will display the fault symbol.

#### BASEPLATE

A one-piece folded mild steel, base-plate protected from corrosion with a high grade of powder coated paint finish, supports all of the components within the package. The base-plate is provided with fork truck slots to enable easy handling from front or end of the package. The compressor unit and drive motor are mounted on a secondary sub-base which is supported on vibration isolating mounts, which reduces operating sound emissions to a very low level.

#### ENCLOSURE

The package enclosure is carefully designed to provide effective sound emission control and suppression, while retaining easy access for maintenance and access to major components. The front door lifts off if required to provide easy access to all routine maintenance points. This door provides easy access to carry out the following maintenance procedures

- Check and top up coolant
- Check intake filter condition
- Change intake filter

- Change coolant filter
- Change separator cartridge
- Service Intake valve
- Check or adjust constant running valve
- Check shuttle valve
- Drain & refill coolant
- Adjust belt tension
- Set and adjust load and unload operating pressures

#### Starter

The starter is accessed through a single front panel, which provides access to all starter components.

#### Drive System

The drive belt system is accessed by removal of the end panel.

#### Cooler cleaning

Cooler cleaning operations are simplified by removing the rear panel, which provides easy access to the inside face of the cooler.

#### Coalescing Filter Maintenance

Access to the twin filters is easy through a simple access panel on the end of the machine

#### Ducting

Inlet Duct and or discharge duct can easily be connected to the machine to single point connections.

Back pressure provision available for cooling airflow is ¼" (6 mm) water gauge

**SSR®**

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**HIGH AMBIENT PACKAGE**  
(Not offered on TAS  
packages)

**SERVICE/MAINTENANCE  
INDICATOR**  
(Optional)

Advanced but simple indicator,  
that is highly visual and  
includes the following -

- Hour meter
- Maintenance indicator -  
bar graph continuously  
indicates remaining  
service life
- Indicator of Fault condition
- Real time clock
- Back light
- Service due warning
- Service overdue