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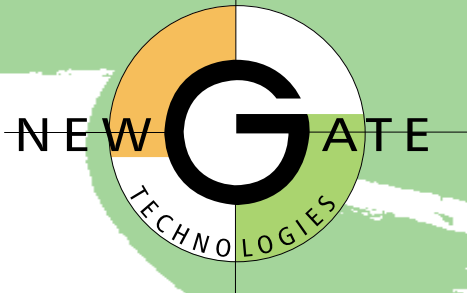
Compressed
air treatment

GRASSAIR WIS[®] Series



oil-free

Rotary Screw Compressors



*Exclusive Supplier
of GrassAir Compressors*



In a Class by Itself

Efficiency, Simplicity and Reliability



Few 5-75 HP oil-free air compressors can match the GRASSAIR WIS® Series Water-Injected Screw Compressor in three critical areas: Efficiency, Simplicity and Reliability.

The WIS® uses treated water as a coolant instead of oil. This results in a near Isothermal Compression, the most efficient way to compress any gas. Energy savings in the range of 10-40% are achievable, compared to other compressors.

The WIS® is the simplest of all oil free compressors available in the market today. The combination of a simple rotary screw design with water injection results in far fewer parts than other compressors in its class. Water injection makes possible the use of a single-stage design with one set of rotors, and a water cooler replaces the conventional oil cooler + air after-cooler and moisture separator combination. There are no elaborate timing gears, no expensive oil and air/oil separator element to replace, no gaskets and zero

possibility of leaks. There are also no inter-coolers, no valves and piston rings to replace, and no environmentally damaging oily condensate to worry about.

Finally, the WIS® is the most reliable of all oil-free compressors in its class. Water injection means low operating temperatures, resulting in extended component life. Low operating speeds also means less wear and tear, resulting in minimal maintenance.

Being the best in each of these areas puts the GrassAir's WIS® Series Water Injected Rotary Screw Compressor truly in a class by itself.

FEATURES

BENEFITS

▪ Rotary Screw design	Compact, quieter (as low as 65 dBA), simple and vibration-free No foundation, no valves, no piston rings Simple to install and maintain
▪ Water Injection	Isothermal Compression/ Greater Efficiency 10 to 40% greater energy savings than other compressors
▪ Water Injection	Only <u>one cooler</u> required No oil coolers, Inter-coolers, after-coolers or moisture separators Less maintenance
▪ Single-stage operation	50% fewer moving parts Lower maintenance costs and Increased reliability
▪ Belt Drive	No cumbersome timing gears, very simple and inexpensive to repair and maintain
▪ Ceramic Rotors	No rusting or corrosion Lower maintenance costs and Increased reliability
▪ Corrosion resistant Aluminum-Bronze alloy air end housing	Eliminates corrosion and cavitation. Improved reliability
▪ Oil free design	No oil filters or separators to change, no expensive oil to buy Absolutely no danger of oil contamination Lower maintenance costs and increased reliability

WIS® oil-free rotary screw compressors

Atmospheric air is drawn into the air-end (12) through the air intake filter (1) and the inlet valve (2). Simultaneously, cool water returning from the heat exchanger (8) is also injected into the air end. In the air-end, the air/water mixture is compressed up to the discharge pressure and is let into the water separator vessel (13).

The air and water are separated in the water separator. The saturated compressed air is then discharged through a minimum pressure valve (4) directly into the plant air system. If the air pressure in the water separator is at any time less than 50 Psig, the minimum pressure valve will not open.

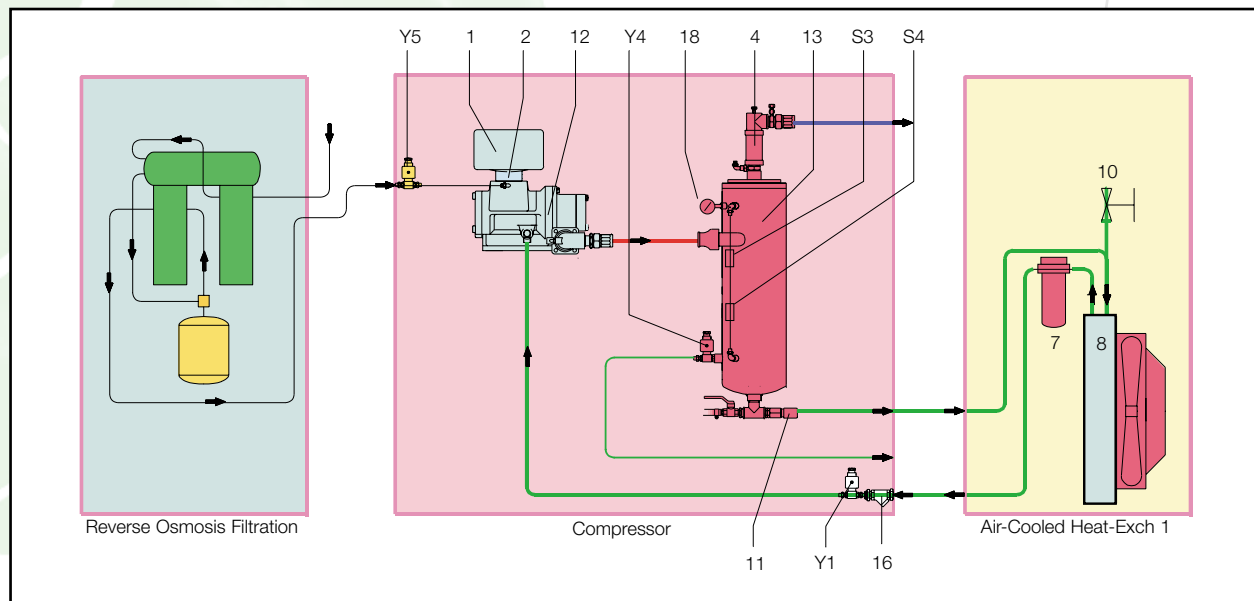
In the water separator vessel, most of the water is separated from the air and drops to the bottom of the separator. Differential pressure allows the water to flow from the separator to the heat exchanger, where it is cooled to within 15°F of the ambient air temperature (air-cooled unit) or cooling water (water-cooled unit).

The water removes almost all of the heat of compression. It also has high capacity to hold heat. As a result, the air/water mixture in the separator is only about 25°F above the air intake (ambient)

temperature. As such, no after-cooler is required for the air. The discharge air is always saturated with water vapor. Depending on the RH and temperature of the intake air, water vapor will either condense into the cooling water or will evaporate into the air stream during the process of compression, thus adding to or subtracting from the cooling water in the loop.

If the level of water, controlled by two capacitance sensors, in the separator is too high, the high level cap. sensor (S3) will open the bleed valve (Y4) and discharge the water to the drain. On the other hand, if the level of water in the separator is too low, the Low level cap. Sensor (S4) will open the water supply valve (Y5) and supply make-up water into the suction side of the air-end. Both water bleed valves have a time delay of 5 seconds.

The heat exchanger (8) will be a fin & tube type for air cooled units and shell & tube type for water-cooled units. In a water-cooled unit, instead of city water, a closed-loop glycol-cooling system can be employed.



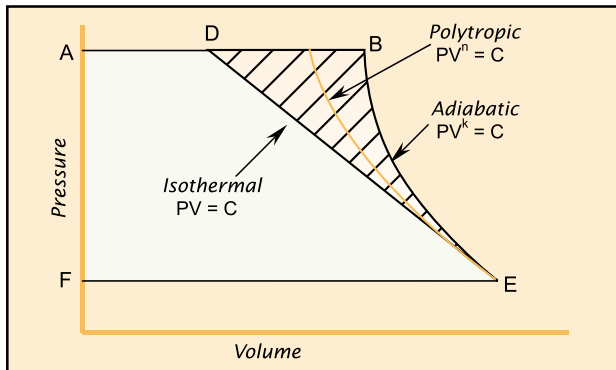
- 1. Air Intake
- 2. Inlet valve
- 4. Minimum pressure valve
- 7. Water filter
- 8. Water cooler
- 10. Ball Valve
- 11. Non return valve
- 12. Air-end

- 13. Water separator vessel
- 16. Waterfilter Strainer
- 17. Valve
- 18. Pressure Gauge
- S3. Capacitance Sensor-High level
- S4. Capacitance Sensor-Low level

- Y1. Water injection valve
- Y4. Drain valve
- Y5. Supplemental water make-up valve

Water Injection results in Isothermal Compression

In Isothermal compression, all the heat equivalent of compressor work is carried away as the gas is being compressed. By using water as a coolant, the GRASSAIR WIS® unit accomplishes near-isothermal compression. As seen below, this results in an energy savings from 10% up to 40% when compared to other compressors in its class. Additionally, it also transforms to higher component life and fewer number of components in the compressor.

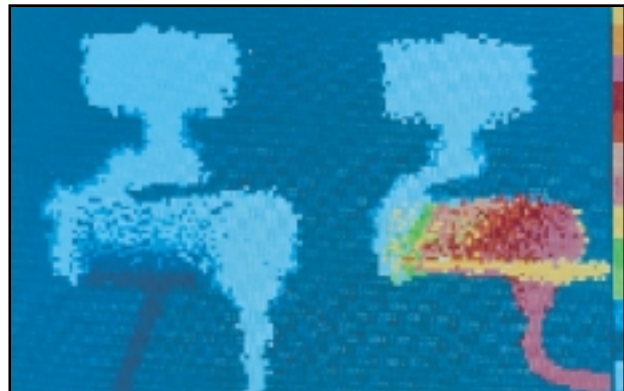


Isothermal Compression means Lowest Compression Energy

At top is the theoretical PV diagram for Isothermal and Adiabatic compression cycles. The area ADEF represents the work required when operating on the Isothermal basis ($PV = \text{Constant}$); and ABEF, the work required on the Adiabatic basis ($PV^k = \text{Constant}$). Clearly, it takes more work to compress and deliver a gas when the compression is adiabatic than when it is Isothermal, the difference being represented by the shaded area. For 100 Psig air compression, this difference is about 27%.

Isothermal Compression means Higher Component Life

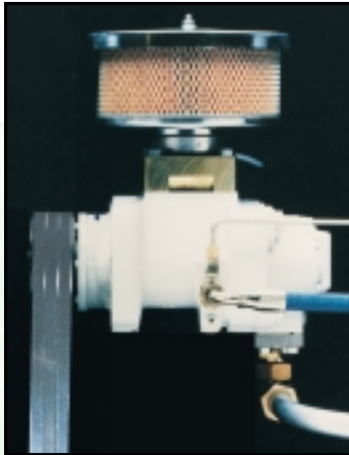
Below is a thermograph illustrating the temperature profile inside the compression chamber (air-end) of the GRASSAIR WIS® oil-free compressor v/s that of a conventional oil-flooded screw compressor. Water injection results in an operating temperature of only 125°F in the WIS® unit compared to about 225°F in a conventional oil-flooded screw compressor, and 320°F in a two stage lobe compressor. This low operating temperature results in less thermal stresses and much higher component life.



Isothermal Compression means Simple Unit with Fewer Components

In conventional oil-free rotary screw or lobe type compressors, removing the heat of compression is a big challenge. These designs therefore resort to two stages with inter-cooling. This means two air-ends to service, more seals, bearings, rotors, gears and piping. Additionally, they use an inter-cooler with moisture separator and trap, after-cooler with moisture separator and trap and an oil-cooler with an oil filter.

In conventional oil-injected screw compressors, a minimum oil injection temperature needs to be maintained in order to prevent moisture condensation and the resulting emulsification. The GRASSAIR WIS® compressor, by using treated and purified water as a coolant, eliminates this problem. Air discharge temperature is so low that after-cooling is unnecessary. Consequently, no Moisture Separator and traps are required.



*Simple
& Reliable
Belt Drive*

The GRASSAIR WIS® Compressor, unlike most other oil-free compressor designs in its class, uses the time-tested V Belt Drive. No complicated Bull Gears, Timing Gears, Couplings and associated bearings - all needing lubrication, prone to failure and requiring continuous maintenance.

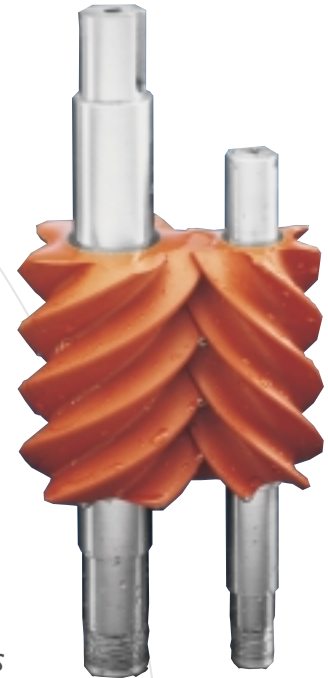


Microprocessor Control

The GRASSAIR WIS® Compressor is equipped with a state-of-the-art microprocessor control panel for instant monitoring and control of the compressor complete with shutdown annunciation. While providing critical information for scheduling normal maintenance, it also minimizes troubleshooting time in the event of a shutdown, by pinpointing the cause of the shutdown.

The panel has separate On-Off switches and the following display menus:

- A Status Menu to indicate operational parameters like critical pressures and temperatures
- An Operational Settings Menu for setting the Load and Unload pressures, and Time delay before shutdown
- A Timer Menu to indicate Total hours, Load hours, Air filter hours and Service hours
- A Fault Log Menu that indicates complete fault diagnostics



Ceramic Rotors

Decades of research at GRASSAIR has led to the development of a high-quality ceramic material for use in the manufacture of the rotors in the WIS® compressors. This material is extremely hard and insensitive to corrosion and wear. This, in combination with a housing made of a specially developed Aluminum-Bronze alloy, and utilizing purified and treated water (see below) as the lubricant, makes for a nearly perfect, efficient and a very reliable air-end.



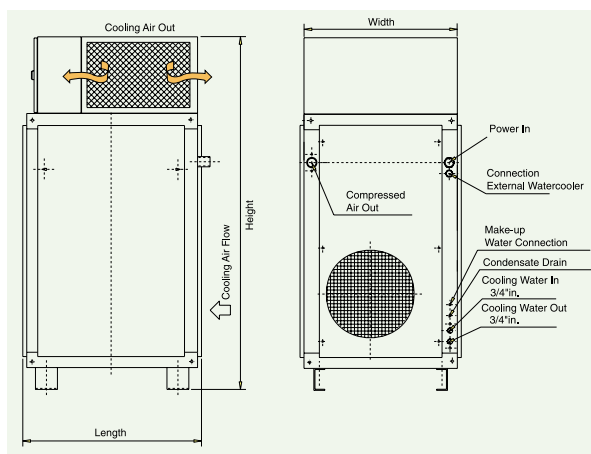
Reverse Osmosis

A reverse osmosis unit is standard with every GrassAir WIS® compressor and ensures that the makeup water is purified before being added to the closed loop water injection circuit. In addition, a high quality water filter incorporated within the system further reduces any threat of water contamination and guarantees long air-end life.

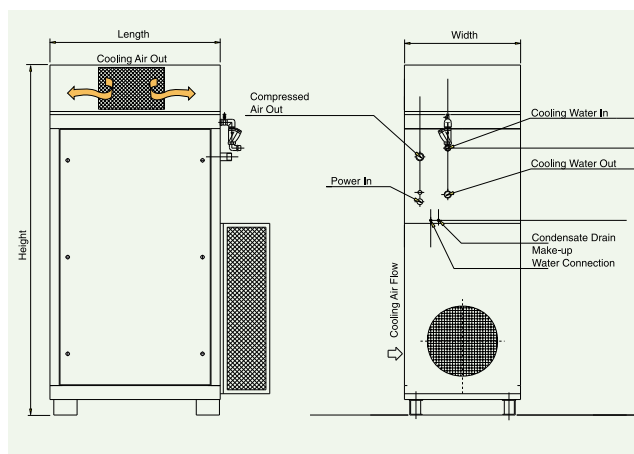
Performance and Connections

WIS® oil-free rotary screw compressors

WIS Model	HP	Capacity, CFM		Air Conn.	Sound Level	Dimensions			Weight
		100 Psig	125 Psig	Inches	dB(A)	L	W	H	lbs
5	5	21	15	3/4	65	30.3	25.6	59.1	550
7	7 1/2	27	24	3/4	67	30.3	25.6	59.1	605
10	10	37	35	3/4	67	30.3	25.6	59.1	660
15	15	66	49	1	70	30.3	25.6	59.1	755
20	20	90	69	1	70	30.3	25.6	59.1	814
25	25	112	95	1	70	30.3	25.6	59.1	870
30	30	127	110	1	70	45.4	28.2	82.7	935
40	40	203	159	1 1/2	72	60	29.5	88.6	1695
50	50	228	200	1 1/2	74	60	29.5	88.6	1740
60	60	274	242	1 1/2	75	60	29.5	88.6	1800
75	75	341	284	1 1/2	76	60	29.5	88.6	2025



Model 5 to 30



Models 40 to 75

Complimentary air purification products from NewGate Technologies, Inc.



Integrated Refrigerated Dryers



High Temperature Refrigerated Dryers



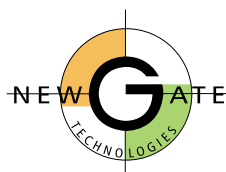
Desiccant Dryers



Air-Cooled Aftercoolers



Compressed Air Filters



NEW GATE TECHNOLOGIES, INC.

WWW.NEWGATETECHNOLOGIES.COM

1137 SW 7TH ROAD • OCALA, FLORIDA 34474

TEL: [352] 351-9992 • FAX: [352] 351-9979