

RSD Series

Energy Saving Refrigerated Dryers
800 - 3000 SCFM
Global Air Treatment



GD GARDNER DENVER®

Energy Saver

Setting The Standard

Many years ago, Gardner Denver set the standard for energy efficient rotary screw air compressors. The goal was to combine the rugged simplicity of the screw compressor with the energy efficiency of the big old reciprocating compressors. We called the new technology the TurnValve™ and introduced it with the Electra-Saver® Air Compressors. Now, almost half a century later, the legendary Electra-Saver® is still one of the most energy efficient designs your money can buy for plants with changing air demands.



Today, Gardner Denver continues that tradition of providing energy saving solutions to help you increase profits and reduce power costs. Challenges for energy efficiency and dew point stability are answered with a technological breakthrough in energy efficient refrigerated air dryer design. We call this energy saver the RSD Series and it is unlike any energy efficient compressed air dryer technology you have ever seen. Only the RSD Series Digital Scroll Refrigerated Air Dryers offer you.

- **Dew Point Stability:** 38°F from 0%-100% of rated flow
- **Energy Savings:** up to 91% power reduction
- **Simplicity:** less moving parts for maximum reliability

TABLE 1: Energy Consumption of Refrigerated Dryer Technologies

Refrigerated Dryer Type	Air Load Percentage						38°F Dew Point
	100%	80%	60%	40%	20%	0%	
GD Digital Scroll	100%	83%	64%	45%	28%	9%	Stable
Non-cycling*	100%	96%	92%	86%	80%	76%	Stable
Cycling Thermal Mass*	100%	100%	100%	77%	50%	9%	Un-stable
Variable Speed*	100%	83%	64%	50%	50%	50%	Stable

* Dryers correctly designed for 38°F dew points

Air Treatment Systems



Presented with a goal to create a complete energy efficient compressed air treatment system, our engineers conceived and designed the RSD Series. This one package is able to provide you with maximum energy efficiency, clean dry oil-free air, and a single set of connections for easy installation.

RSD Series Digital Scroll Refrigerated Air Dryers combine proven elements to your advantage for:

- 1 Dew Point Stability:** Unparalleled 38°F dew point stability is maintained under all load conditions up to and including the full capacity rating
- 2 Water & Particulate Removal:** Grade B Filtration rated 3 micron is included as standard within our Moisture Separator to ensure 99% efficiency as a minimum
- 3 Oil Removal:** Optional, integral Grade E cold coalescing Filtration is available to provide air quality security with oil removal to 0.008 ppm

Digital Scroll...

...Compression Made Simple

There are less moving parts in the entire Digital Scroll refrigeration circuit. The motor shaft/orbiting lower scroll assembly, the upper scroll, and a solenoid valve tested to 40 million cycles that loads and unloads the hermetically sealed refrigerant circuit. The RSD Series' patented Digital Scroll compression technology benefits you with:

Radial Compliance... the ability to automatically adjust the side-to-side movement of the scroll set to accommodate the presence and removal of non-compressible elements such as liquids or solids in the event of abnormal conditions

Axial Compliance... enables the digital load control solenoid to move the upper scroll up-and-down 4/1000 of an inch, to load and unload the refrigeration compressor

Less Parts... means greater reliability. Piston compression requires 9 parts per cylinder. Digital Scroll compression is accomplished with only two parts; the upper and lower scroll set.



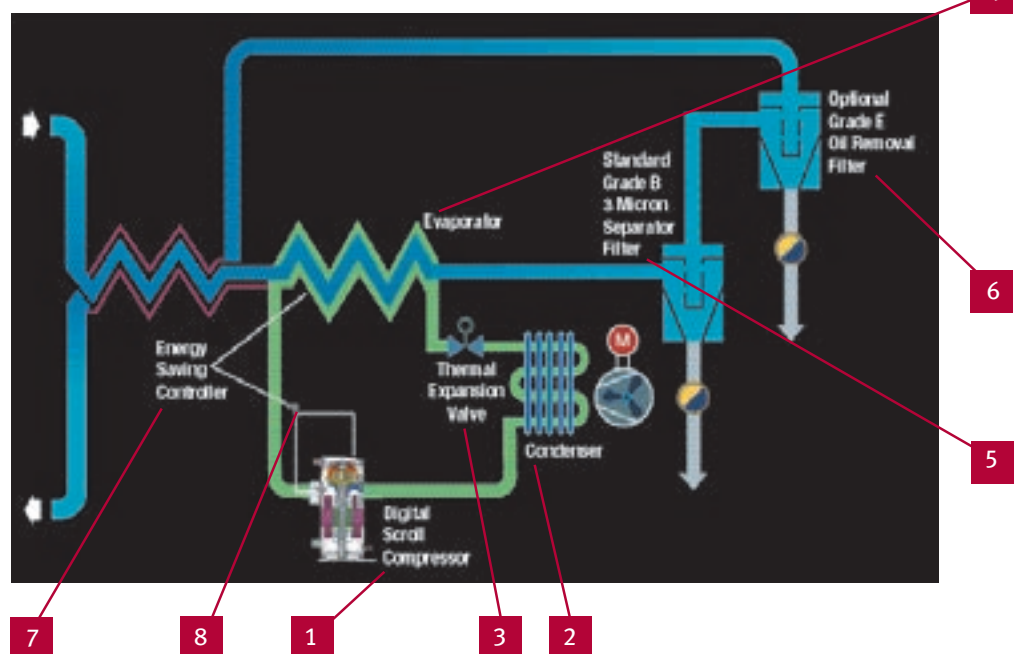
Refrigeration Circuit...

...Simple, Original Cooling

The beauty of the Digital Scroll refrigeration circuit is in its simplicity. Environmentally friendly low-pressure R-404a refrigerant gas is pressurized in the Digital Scroll Compressor (1). Once compressed into a high-pressure gas, it then flows through the condenser (2) and changes to a cold 35°F liquid. The thermal expansion valve (3) precisely meters the cold liquid refrigerant into the evaporator (4) where the work is done. Hot, saturated compressed air enters the evaporator at the end opposite the incoming liquid refrigerant. The compressed air is chilled as they cross paths. Water is condensed out of the cold exiting air and is efficiently removed in the Separator/Filter (5). When ordered, the Grade E cold coalescing filter (6) removes oil droplets and aerosols to 0.008 ppm. The warm refrigerant is now a gas and returns to the Digital Scroll Compressor to continue the process.

While the compressor continues to run, the Energy Saving Controller (7) automatically energizes and de-energizes the solenoid valve (8) to load and unload the compressor. This precisely controls the flow of the refrigeration circuit to exactly match your load conditions. We maintain a stable 38° F pressure dew point, and provide you with maximum energy savings.

FLOW CIRCUIT



ESC Controller...



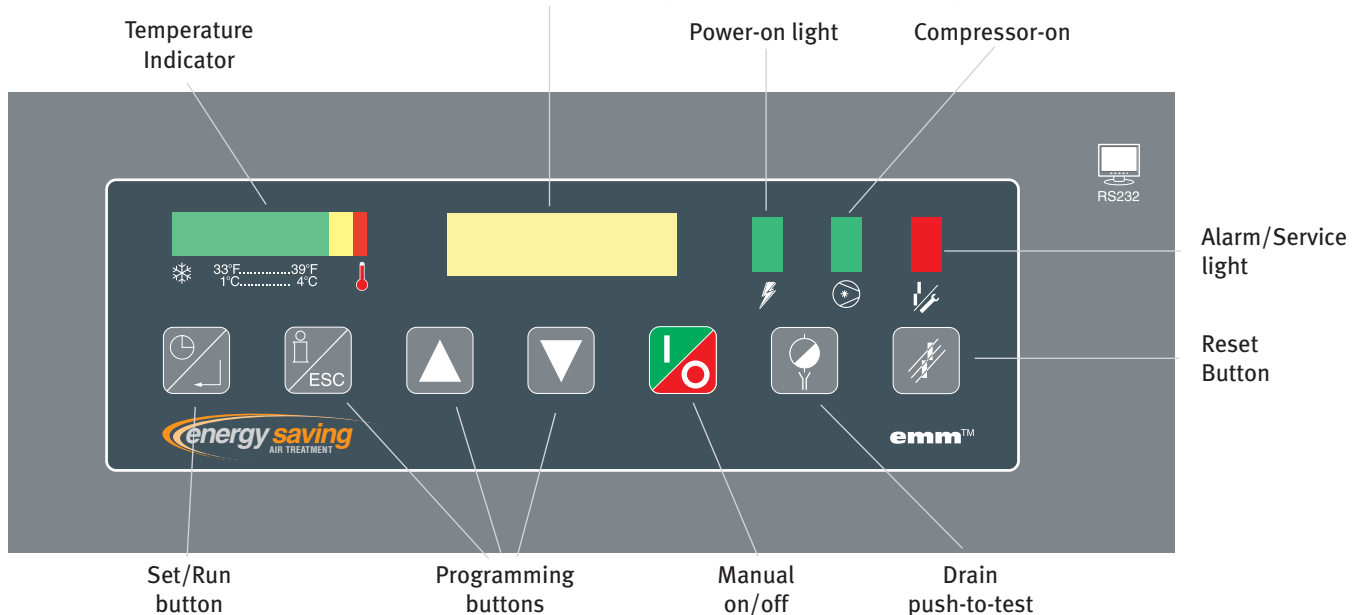
...State-of-the-Art Instrumentation

The RSD Series' Energy Saving Controller (ESC) combines advanced electronics with globally recognized symbolism for simple at-a-glance operational security that includes an RS-232 communications interface port.

ESC Controls benefit you with:

- **Operating Mode...** Digital Scroll mode automatically adjusts to your load. Scheduler mode lets you profit during anticipated shutdowns and restarts (i.e. 2 shift operation, weekends off.) with no time lag. Not having to cool down thermal mass storage allows instantaneous savings and your workdays to coexist.
- **Auto-Restart...** this is one piece of equipment you won't have to worry about restarting after a power glitch. Programming stays in memory, too.
- **Emergency Shutdown...** panel mounted emergency shutdown button on front panel.
- **Power Graphs...** sequential hi-visibility LED power bars simultaneously display percentages of real-time power savings and running load capacity to validate your investment.
- **Dew Point Indicator...** graduated hi-visibility LEDs display drying process temperature status to confirm you're getting what you paid for.
- **Text Display...** vacuum fluorescent text display emits current time, operating mode, hours to service, total operating hours, active faults and more. Genuine standard text formats include English, Spanish, German, French and Italian. Nine other languages are available to best serve your needs.
- **Remote Monitoring...** RS-232 communication port is standard equipment to allow you to keep track of unmanned equipment in remote installations.

Readouts for: Current time/Total operating hours/Operating status/
Hours to service/Active faults/Energy savings/Percent of capacity



Premium Design Features



Digital Scroll Refrigeration Compressor

- Rugged digital scroll compression improves efficiency, durability and reliability and lowers decibel sound levels.
- Simple reliable operation results from having only two parts, a fixed upper scroll and an orbiting lower scroll.
- Long-life Scroll-set compression sealing surfaces are impregnated to wear-in and improve with time.
- Radial compliance controls the operation of the orbiting scroll set. Axial compliance controls the energy savings. Combined they excel at tolerating abnormal conditions like liquid slugs and solids.

Platform/Chassis

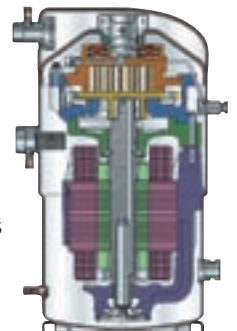
- Design allows back-side of dryer to be placed against the wall.
- Connections: compressed air inlet/outlet portals are located through the roof for easy access to interior.
- Cooling air flow: enters one side and exhausts out the top for better ventilation and noise reduction.
- Lift out panels replace the hinged filter access doors for better access to interior.

Exclusive Heat Exchanger Design

- Energy efficiency is maximized through the design of our exclusive plate type heat exchangers. Crafted from premium grade 316 stainless steel.
- No Prefiltration is required due to large bore, smooth channels that eliminate places for dirt, rust, and scale to accumulate. Less pressure drop saves you more energy.
- Integral Blow-Gun makes surface cleaning easy, saves time and maintains efficiency.

Maximum Extraction Separator/ Filter

- 99% effective moisture removal at all flow rates to preserve dew point stability.
- Standard Grade B two-stage cold filtration ensures maximum water extraction under low flow conditions.
- Stage one mechanically entraps solids >10 microns with dual stainless steel orifice tubes. Stage two utilizes in-depth fiber media to coalesce water droplets and retain solid particles 3 microns and larger.



Optional Integrated High-Efficiency Oil Removal Filter

- Optional Grade E two-stage cold coalescer efficiently removes fine solids and oil aerosols.
- Stage one uses multiple layers of fiber media to retain solids down to 0.01 micron.
- Stage two incorporates in-depth coalescing fiber media and an outer-coated, closed cell foam sleeve to remove oil aerosols and polish the air to 0.008 ppm.

Dedicated Zero-Air-Loss Demand Drains

- Electronic energy saving demand drain is standard on Separator/Filter.
- Secondary drain is standard with optional Grade E Cold Coalescer.
- Maximum reliability from large orifice and proven level sensor.
- Intelligent electronics control cycling frequency and discharge duration.

Precise Energy Savings

Dew Point Stability & Energy Efficiency...what a concept!

For decades, compressed air drying technologies have forced you to choose between pressure dew point stability and energy efficiency. Why? Because until the RSD Series was invented, it was virtually impossible to deliver both at the same time! Dew point stability relies on prompt responses of cooling-energy to the changes in heat load generated by swings in ambient conditions and compressed air flow. Energy savings result from interpreting those very same changes and then controlling the response of the refrigeration compressor.

Advanced Digital Scroll cooling technology holds your dew point steady and starts saving you money the minute you turn it on. Digital Scroll compression uses environmentally friendly R-404a refrigerant and consumes less energy. You benefit with a steady 38°F pressure dew point that matches your plant air demand to the second and your drying costs to the penny.



COMPARE TECHNOLOGIES

1 Digital Scroll

Digital Scroll technology holds a steady dew point while it examines the actual heat load to know precisely when to start and stop the flow of the refrigerant. Maintaining constant motor speed and winding temperature ensures maximum motor lubrication and service life. Revolutionary design matches energy consumption to work load to achieve up to 91% energy savings while in operation. Scheduler mode totally eliminates all intermittent energy consumption during non-working hours without compromising dew point stability when work begins anew.

2 Hot Gas Bypass Valves (HGBV)

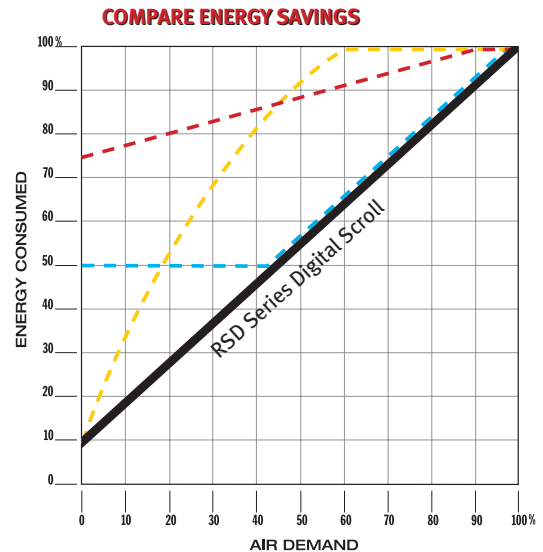
“Non-cycling” systems use a HGBV and run continuously to control the flow of the refrigerant and maintain a stable dew point. Energy consumption remains fairly constant regardless of air demands. Ideal for a stable pressure dew point at full load conditions.

3 Thermal Mass Storage

Cycling systems normally use a volume of a chemical called Propylene Glycol or Sand to store cooling energy so the refrigeration compressor can be stopped and started. Energy is saved while the compressor is off. Start/stop temperature differential set points may produce an unsteady dew point. Dew point spikes can allow up to 120% more water vapor to remain than when maintaining a steady 38°F pressure dew point.

4 Variable Frequency/Speed Drive (VFD or VSD)

Motor speed is controlled by electronics that manufacture variable AC power. Energy savings maximizes at 50% of speed. Limiting motor speed reductions to 50% minimizes upper motor bearing lubrication losses that increase as compressor speed is reduced. HGBV is included to control dew point when operating below 50% of rated capacity.



- 1 ——— RSD Series Digital Scroll
- 2 - - - Non-Cycling
- 3 - - - Cycling Thermal Mass
- 4 - - - Variable Speed

The Bottom Line...

...Energy Savings

System Pressure Savings

RSD Series Dryers start saving you money before you even turn them on. Your first line of savings results from being able to reduce your system pressure. Pressure savings result from our exclusive heat exchanger design that doesn't need a Prefilter. You save by not having to purchase and install a prefilter or, pay for the costly pressure drop associated with it. This feature alone saves you 2-5% of the rated brake horsepower of your air compressor.

RSD Series Annual Savings* without a Prefilter			
Air Flow	Air Compressor Motor	4 psi Saved	10 psi Saved
scfm	kW	(2% power)	(5% power)
800	119.4	\$2,028	\$5,071
1000	149.2	\$2,536	\$6,339
1250	186.5	\$3,169	\$7,924
1500	223.8	\$3,803	\$9,508
1750	261.1	\$4,437	\$11,093
2000	298.4	\$5,071	\$12,678
2500	373.0	\$6,339	\$15,847
3000	447.6	\$7,607	\$19,017

* Based on 5 scfm/HP,
\$.097/kWh, 8760 hours.
Typical prefilter pressure drop
is 4 psi.
Maximum recommended
differential pressure is 10 psi.

Productivity Savings

Manufacturing productivity averages 81% of available time per shift. The remaining 19% of working hours is comprised of coffee breaks, lunch breaks and shift changes. Air demands may drop sharply due to curtailed usage during those periods. The RSD Series' unrivaled efficiency will match those demand changes and shift the savings to your bottom line.

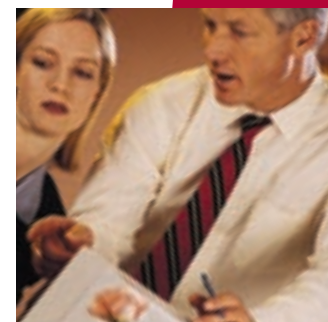
It is common to have large surges in plant air demand that challenge system capacity for a brief period. This gives you the illusion that you are running your compressors at full capacity. However, many air system audits find continuous changes in demand with 75% of capacity representing a typical average load for first shift operation. Lighter loads on second shift may reduce air demand to less than one-half of capacity, and even less on third shift. Rely on the RSD Series to automatically maximize your bottom line energy savings.

Table 3:

Average Air Flow %	Energy Consumption %	RSD Energy Savings per year by model*							
		800	1000	1250	1500	1750	2000	2500	3000
100%	100%								
75	78	\$1,275	\$1,603	\$1,210	\$261	\$1,072	\$803	\$1,065	\$1,408
50	54	\$1,907	\$2,280	\$2,189	\$1,691	\$2,728	\$2,704	\$3,330	\$4,372
25	33	\$2,426	\$2,835	\$3,002	\$2,893	\$4,112	\$4,298	\$5,226	\$6,855
0	9	\$3,058	\$3,512	\$3,981	\$4,332	\$5,768	\$6,200	\$7,491	\$9,800

* Savings vs. typical non-cycling designs at \$.097 per kWh

RSD SERIES ANNUAL SAVINGS ESTIMATOR					
		Example		Your Savings	
Step 1:	Determine Maximum Air Demand	1000	scfm		scfm
Step 2:	List Average Air Demands	1st shift	100	100% load	0-100%
		2nd shift	75	75% load	0-100%
		3rd shift	50	50% load	0-100%
	Break periods, shift changes	19	Time Constant	19	Time Constant
Step 3:	Totalize shift values	244	Total		Total
	Divide by number of entries	4	4 entries		# of entries
	Attain average load profile percentage	61	61% load avg.		Percent of load
Step 4:	Insert "No Prefilter" savings from table 2	\$2,536	4 psi saved		psi saved
	Add closest dollar savings from table 3	\$1,603	75% load		% of load
	Conservative Annual Savings Estimate	\$4,139	Model RSD1000		RSD Model



RSD SERIES SPECIFICATIONS									Total Air Treatment System Pressure Drop with Integrated Filtration			
									With Standard 3 Micron Fil Series Grade B Separator/Filter		With Optional 0.008 ppm oil Fil Series Grade E Integrated Filtration	
Model	Rated Flow (1) (scfm)	Voltages (V/ph/Hz)	Power (kW)(2)	Connection (in)(3)	Dimensions (in)			Wt. (lb)	psig	bar	psig	bar
					H	W	D					
RSD800	800	208-230/	4.28	3 NPT	85	49	41	1124	1.6	0.11	4.4	0.30
RSD1000	1000	3/60	4.68	3 NPT	85	49	41	1146	2.3	0.16	5.8	0.40
RSD1250	1250		6.34	4 ANSI Flg	85	49	51	1521	3.5	0.24	7.9	0.54
RSD1500	1500	460/3/60	8.68	4 ANSI Flg	85	49	51	1563	4.8	0.33	10.1	0.70
RSD1750	1750	380-420/	10.35	6 ANSI Flg	85	55	60	1940	2.1	0.14	5.2	0.36
RSD2000	2000	3/50	11.72	6 ANSI Flg	85	55	60	1997	2.7	0.19	6.2	0.43
RSD2500	2500		14.00	6 ANSI Flg	85	55	60	2315	4.0	0.28	8.4	0.58
RSD3000	3000	575/3/60	18.33	6 ANSI Flg	85	55	60	2646	5.0	0.34	10.3	0.71

Notes:

- a. All models utilize R404a refrigerant with Digital Scroll compressors.
 - b. All models utilize a standard electric demand drain.
 - c. Second electric demand drain is standard when optional integrated Grade E oil removal filter is selected.
 - d. Maximum Operating Pressure 200 psig (14 bar), Maximum inlet temperature: 120°F (49°C).
- (1) Rated Flow Capacity - Conditions for rating dryers are in accordance with CAGI (Compressed Air and Gas Institute) Standard ADF100 working conditions: inlet air at 100 psig (7 bar) and 100°F (38°C) saturated, ambient air at 100°F (38°C), operating on 60 Hz power supply. At rated conditions, outlet pressure dew point is 38°F (3°C).
- (2) At 35°F (2°C) evaporator and 100°F (38°C) ambient.
- (3) BSP connections and DIN flanges available.
- (4) All models are UL/CSA certified.

TABLE 1 - CORRECTION FACTORS (MULTIPLIERS) FOR INLET AIR TEMPERATURE AND PRESSURE

INLET PRESSURE (PSIG)	INLET TEMPERATURE				
	80°F (27°C)	90°F (32°C)	100°F (38°C)	110°F (43°C)	120°F (49°C)
50	1.35	1.05	0.84	0.69	0.56
80	1.50	1.17	0.95	0.79	0.66
100	1.55	1.23	1.00	0.82	0.70
125	1.63	1.31	1.07	0.91	0.74
150	1.70	1.37	1.13	0.95	0.80
175	1.75	1.42	1.18	0.99	0.84
200	1.80	1.47	1.22	1.03	0.89

To adjust dryer capacity for conditions other than rated, use Correction Factors (multipliers) from Tables 1, 2 and 3.

Example: What is the capacity of a model RSD1000 when the compressed air at the inlet to the dryer is at 150 psig and 100°F (38°C), the ambient temperature is 90°F (32°C) and a 50°F (10°C) dew point is desired?

Answer: 1000 scfm (rated flow from Specifications Table) x 1.13 (correction factor for inlet temperature and pressure from Table 1) x 1.06 (correction factor for ambient temperature from Table 2) x 1.3 (correction factor for dew point from Table 3) = 1560 scfm

TABLE 2 - CORRECTION FACTORS FOR AMBIENT TEMPERATURE*

AMBIENT TEMPERATURE	80°F (27°C)	90°F (32°C)	100°F (38°C)	110°F (43°C)
Multiplier	1.12	1.06	1.00	0.94

*Air-cooled models only. For water-cooled use a 1.15 multiplier if cooling water is less than 95°F (35°C)

TABLE 3 - CORRECTION FACTORS FOR DEW POINT TEMPERATURE

DEW POINT TEMPERATURE	38°F (3°C)	45°F (7°C)	50°F (10°C)
Multiplier	1.0	1.2	1.3



For additional information contact your local representative or Gardner Denver Compressor Division, 1800 Gardner Expressway, Quincy, IL 62305 Customer Service Department Telephone: (800) 682-9868 FAX: (217) 224-7814 Sales and Service in all major cities.
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