Subfreezing Dryers

360-1,600 m^3/h (210-940 cfm) Air Flow
-20°C (-4°F) Pressure Dew Point

SF DRYERS OPTIMIZED FOR CLASS 3 AIR QUALITY

For applications that require air with ISO Class 3 Pressure Dew Point (PDP) of -20°C (-3°F) or negative/subfreezing PDP, we've expanded our family of high-quality air dryers with our new SF dryers. They combine the ease of maintenance and operation of a refrigerated dryer with the subfreezing pressure dew points typically associated with a desiccant dryer. Our latest addition, the D1600SF, offers best-in-class total cost of ownership in PDP subfreezing applications up to 1,600 m^3/hr.

Reliability

- Dew points as low as -20°C (-4°F), meeting Class 3 requirements
- Ideal for systems that have piping exposed to subfreezing temperatures
- High-quality air prevents damage or loss due to moisture related problems, like system corrosion or product degradation
- High-performance, low-maintenance switching pneumatic valves reliably control drying and regeneration cycles
- Victaulic™ connections ensure leak-free operation and eliminate thermal stress

Efficiency

- No energy-consuming devices such as heaters or blowers required for regeneration
- Does not require purge air, resulting in significant energy savings versus conventional desiccant dryers
- Smart solenoid drain valves actuated based on condensate level ensure complete drainage during each cycle without wasting compressed air

Productivity

- Assures 100% air compressor utilization by eliminating wasteful purge air requirements
- Refrigeration-based drying system does not require periodic drying media replacement
- Removable side panels provide easy access for inspection and routine maintenance
- Advanced controller permits remote viewing of critical parameters via standard internet browser
- Integrated heaters for regeneration at low load (below 20%) and low inlet temperature
- Helix™ Connectivity for real-time insights and operating data to keep your dryer operating at peak performance

Low Cost of Ownership and High Air Quality

The regenerative SF dryer uses refrigerant instead of desiccant in the drying process. This unique approach has many benefits that makes it ideal for compressed air applications that require Class 3 (-20°C) PDP dry air.

Lower Maintenance Costs

The SF dryer has no costly consumables that require periodic replacement such as drum wheels or desiccant beads. In addition, no external heaters or blowers are required for regeneration, reducing the need for high-maintenance equipment.

Improved Efficiency

Typical desiccant dryers use upwards of 15% purge air for regeneration, which equates to 15% of the energy cost of the compressor. The SF dryer does not require purge air, eliminating this wasted energy cost.

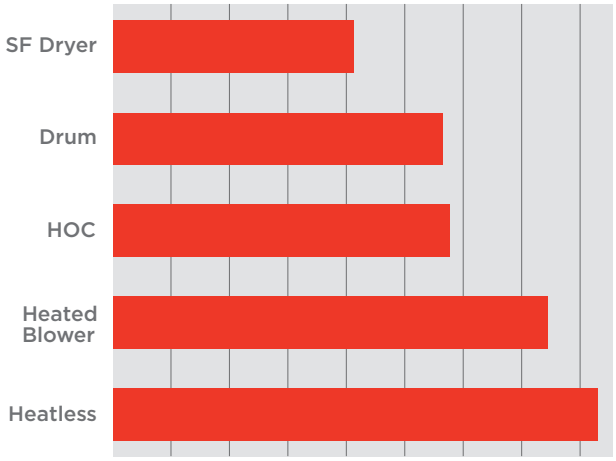
Reduce Equipment and Operating Cost

Since the SF dryer does not consume purge air, 100% of the air supplied by the compressor is available downstream to the dryer. This eliminates the need to upsize equipment.

Installation Made Easy

With a 40% smaller footprint, the SF dryer uses less floor space and is fully compatible with all compressor types (both oil-flooded and oil-free) without requiring any costly modifications to the air compressor or downstream particulate filtration.

SF Dryers Reduce Cost of Ownership



Typical 5-year total cost of ownership profile

Total Protection That Eliminates Risk

PackageCARE™ represents the greatest value for asset management by transferring operational risk to Ingersoll Rand. We are responsible for scheduled maintenance, as well as using predictive and analytical tools to help prevent unexpected interruptions in your production as well as lower cost of ownership.

Choose the Right Maintenance Program for You

Innovative Design and Efficient Operation

The SF dryer is a regenerative refrigerant dryer that has been designed specifically for ISO Class 3 applications that require high-quality -20°C (-4°F) PDP. It operates similarly to a desiccant dryer, with twin drying chambers that continuously cycle between drying and regenerating to remove moisture while maintaining a constant subfreezing PDP.

During the subfreezing drying process, moisture (condensate) forms as a thin layer of frost on the inner walls of the heat exchanger. To regenerate, the dryer switches the airflow path, allowing warm incoming air to pass through the heat exchanger, melting the frost and discharging the water through a no-loss drain. The key advantage of this process is the significant reduction in energy required to remove moisture from compressed air.

How the SF Dryer Works

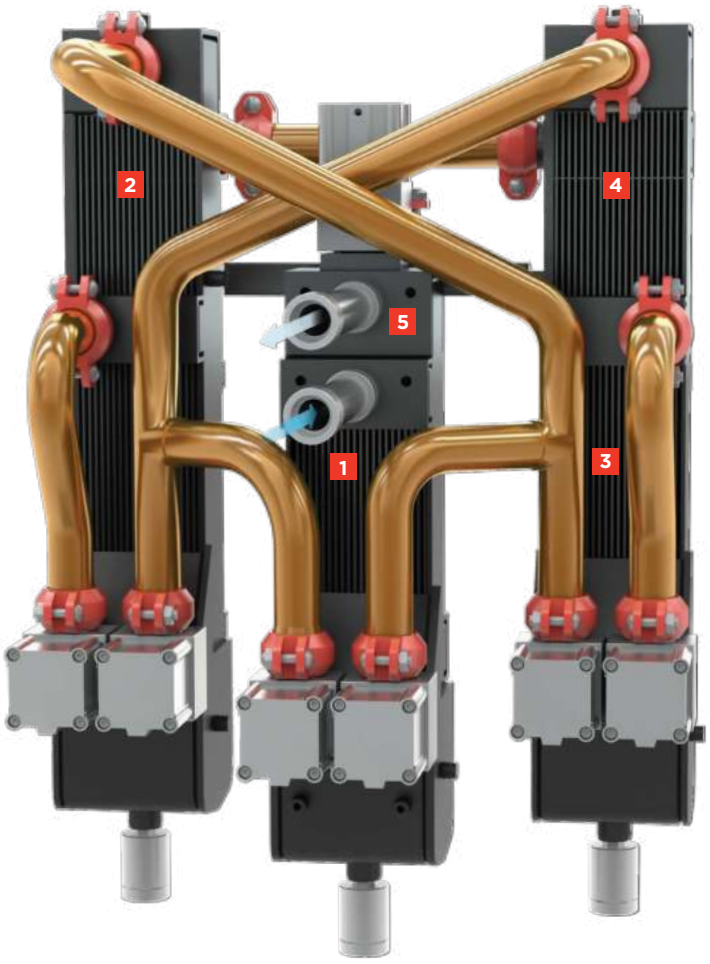
1 **PRE-COOLING:** Air enters the dryer through the pre-cooler/re-heater, where it is cooled and dried to 15°C (59°F) PDP, removing 70% of the moisture content in the air.

2 **REGENERATION:** Leaving the pre-cooler/re-heater, the air enters the first heat exchanger for regeneration by removing a thin layer of frost that has accumulated on the inner walls during the previous drying cycle, reducing the moisture content to 20%. Simultaneously, the air is cooled and dried to 3°C (37°F) PDP.

3 **DRYING:** With only 10% of the moisture remaining, the air now enters the subfreezing dryer heat exchanger where it is cooled and dried to -20°C (-4°F) PDP. The removed moisture begins to form a thin layer of frost on the inner walls of the heat exchanger.

4 **REHEATING:** The dried air is reheated before exiting the dryer in two steps. First, the air re-enters the upper part of the second heat exchanger and is heated by the incoming air to -5°C (23°F) while still maintaining its PDP.

5 **REHEATING:** Next, the air re-enters the common pre-cooler/re-heater unit and is heated by the incoming air to 25°C (77°F) while still maintaining its PDP.



The SF Dryer Advantage

The innovative SF dryer surpasses traditional high-quality air dryer performance because it is designed specifically for ISO Class 3 -20°C (-4°F) PDP.

Why Class 3 Air Quality is Critical

Saturated air, aerosols and water can compromise efficiency and raise maintenance costs. Class-3 air helps protect against:

- Corroded air storage and distribution systems
- Damaged valves, cylinders, tools and production equipment
- Ruined products or packaging
- Bacterial growth

See Our Entire Portfolio of Subfreezing Dryers

How the SF Dryer Compares to Other Technologies

Feature/Attribute	DRYER TECHNOLOGY HOC	Drum	Desiccant	Subfreezing
Delivers Class 3 air quality dry air at -20°C (-4°F) PDP	✓	✓	✓	✓
Protects pipes from freezing when they are exposed to low ambient temperatures	✓	✓	✓	✓
Compatible with all compressor types (oil-flooded and oil-free)	✗	✗	✓	✓
Provides 100% compressed air availability over the full range of compressor utilization (20-100%)	✓	✓	✗	✓
Operates without drying agents that require particulate filtering	✗	✗	✗	✓
Low maintenance costs	✗	✗	✗	✓
No additional cost required for compressor modifications	✗	✗	✓	✓
Low pressure drop (max 0,2 barg)	✗	✗	✗	✓
No post filter required	✗	✗	✗	✓

Optimized Performance

A HIGH PERFORMANCE VALVES:
High performance switching valves precisely control the flow and sequence of the drying and regeneration cycles.

B SMART SOLENOID DRAINS:
Electronically actuated smart solenoid drain valves located at the bottom of each drying chamber completely remove all condensate based on demand.

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Precision Control

Delivering Class 3 air quality cost-effectively requires advanced logic integrated with precise timing. The Xe-90 controller, with Progressive Adaptive Control (PAC™), manages drying efficiency wand air quality automatically.

The controller monitors up-to-the-second operating conditions and provides precise control over continuous drying and regenerating cycles to ensure -20°C (-4°F) PDP, regardless of changes to compressed air demand or ambient temperatures. Advanced real-time monitoring of the air system ensures air quality and efficiency with full integration with the plant system.

Reliable Compressed Air from Start to Finish

Minimise your total cost of ownership with Ingersoll Rand's extensive knowledge of compressed air systems, services, parts and accessories—**we are your trusted partner in compressed air systems.**

YOUR TRUSTED PARTNER IN COMPRESSED AIR

Staying ahead of your competition with advanced compressed air systems and services that boost productivity, lower operating expenses and extend equipment life is critical to your success.

No matter the industry or application, you can count on Ingersoll Rand® as a trusted partner for compressed air technologies and services. By focusing on you and your business, we provide collaborative solutions that make you successful, offering a total system approach to maximize efficiency and performance.

Take a Systems Approach

Delivering reliable compressed air to your facility goes well beyond the compressor itself. Optimize total cost of ownership (TCO) through a systems approach that employs the best air compression technologies to deliver reliability for life—from design to decommissioning.

Your business will benefit from Ingersoll Rand's partnership through our extensive experience and global expertise to ensure reliability, lower maintenance costs, ease of serviceability and system optimization.

Let's Get Started Together

Throughout the entire lifecycle, our systems approach helps you achieve the lowest operating cost.

Ingersoll Rand Contracting Services Video

About Ingersoll Rand Inc.

Ingersoll Rand Inc. (NYSE:IR), driven by an entrepreneurial spirit and ownership mindset, is dedicated to helping make life better for our employees, customers and communities. Customers lean on us for our technology-driven excellence in mission-critical flow creation and industrial solutions across 40+ respected brands where our products and services excel in the most complex and harsh conditions. Our employees develop customers for life through their daily commitment to expertise, productivity and efficiency. For more information, visit www.IRCO.com.

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