KEMP
kemp-spx.com

ORIAD® SERIES DRYERS

A PARAGON OF EFFICIENCY & ECONOMY

LOOK TO KEMP'S PROVEN DESIGN – THE ORIAD® DRYER

A key to the efficiency and economy of Kemp's desiccant dryers is the simplicity of their basic design and particularly that of their regeneration systems.

Multiple heaters in stainless steel tubes spaced evenly throughout the cross section of the drying towers liberate moisture from the desiccant in an arrangement that distributes heat immediately and evenly through-out the entire area and bed length. A very small amount of purge gas (2%) is required to carry the liberated moisture from the towers.

MEETING THE NEEDS OF INDUSTRY

Kemp has over 100 years of leadership in fluid processing and specifically in the areas of adsorption technology:

- Kemp designs and manufactures the broadest line of desiccant dryers for air, gas and liquid applications
- Kemp Application Engineers can also "custom" design your system to meet unique or unusual process applications
- Kemp's field representatives are factory trained and service technicians are available to respond quickly
- Kemp quality is value engineered into each system
- Kemp custom builds each dryer in our ISO 9001 approved facility

FEATURES AND BENEFITS

- Exceptionally low life cycle costs
- Outstanding efficiency and lowest energy usage
- Continuous pressure dew points -40°F to -100°F

LOWER OPERATING COSTS GUARANTEED

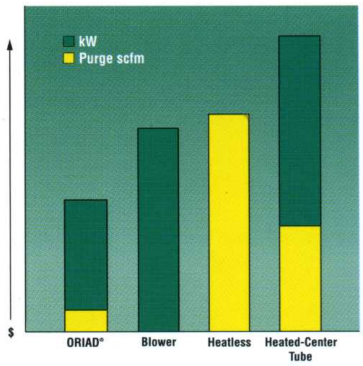
The results of Kemp's heater and purge design are three-fold:

1. Less heater kW's required for regeneration
2. Fewer kW hours are required for regeneration
3. Less purge gas is required for regeneration

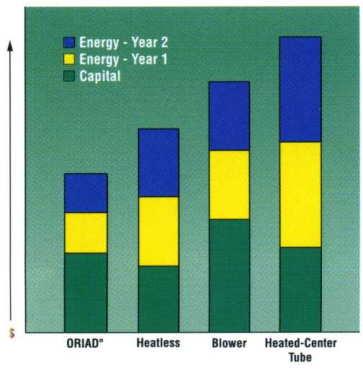
The graphs below project relative examples of different dryer types. The "real cost" includes the cost of capital equipment and the cost of operation at full capacity.

The Kemp ORIAD® has the lowest overall cost due to the ORIAD® Dryer's regeneration system design. The best comparison is the annual energy savings that will be realized year after year.

Operating Cost Comparisons



Two Year Cost of Ownership



Note: These comparisons do not reflect any additional savings that can be realized with Kemp's Moisture Load Control option that matches regeneration requirements with actual moisture load.

THE ORIAD® DRYER – FEATURES

Flow Diversion Valves
On models 7010 through 7050; non-lubricated diaphragm type valve. Model 7060 and larger use two-way high performance butterfly valves.

Towers
Constructed of carbon steel material in accordance with the ASME Code, Section VIII, Division I, for 135 PSIG with 1/16" corrosion allowance and National Board stamped. Desiccant fill and removal nozzles are furnished on each tower.

Moisture Load Control
With precision Digital Moisture Analyzer

Control Panel
Microprocessor solid state controller. Graphical display with multi-line back-lit LCD and RS232 output. NEMA 4 Standard, (Class 1, Group D, Division II optional). Wiring in accordance with N.E.C.

Filters
Low pressure drop and high removal efficiencies.

Moisture Indicator
Color changing type.

Purge Flow Indicator
Calibrated orifice with pressure indicator and throttling valve adjusting and measuring the reactivation purge flow.

Pressure Gauges
Line mounted or on optional panel mount.

Outlet Valves
Non-metallic seated check valves. Eliminates back flow through the dryer during compressor shut down or valve reversing.

Screen Nozzle
Tower inlet incorporates a removable stainless steel screen nozzle.

Control Air Filter
Compact design and light weight construction with manual drain. Easy cleaning - no tools required. Low, three micron rating.

Heater Temperature
Thermocouples mounted in each desiccant tower to sense temperature of desiccant and control reactivation heater input.

Safety Relief Valve
One per tower in accordance with ASME Code.

Repressurizing
Automatic system with pneumatically controlled valve or solenoid valve minimizes downstream pressure changes and desiccant bed disturbances.

Depressurization
Orifice controlled for slow depressurization and added protection of the desiccant.

Desiccant
Kemp layered bed design utilizes a combination of desiccants for guaranteed low dew point performance.

THE ORIAD® DRYER – HOW IT WORKS

PRINCIPLE OF OPERATION

Designed for economical drying of air and industrial gases, the ORIAD® 7000 Series dryer uses internal electric heating elements in conjunction with a small quantity of the dried process gas (generally less than 2 percent) to remove moisture that has been adsorbed on the desiccant. This dual tower unit efficiently provides dry air or gas products downstream with all operations automatically controlled.

The saturated gases enter the dryer through a non-lubricated inlet valve where the flow is diverted to the tower in drying service. Moisture is removed from the gas by adsorption during passage through the desiccant. The dried compressed gas flows through an outlet valve and exits at the "Dry Gas Outlet".

Reversal of process flow from one tower to the other is accomplished by the automatic opening and closing of inlet flow diversion valves. While process gas is being dried during its passage through the desiccant bed, adsorbed moisture in the other tower is removed by heat from internal electric heaters in combination with a small quantity of previously dried gas called "reactivation purge".

A calibrated orifice with a pressure indicator and throttling valve is furnished to measure and adjust the reactivation purge flow.

Fully Automatic Operation – All operations are accomplished automatically and are controlled by Kemp's microprocessor controller. The flow diversion valves are shifted automatically at the end of each adsorption cycle by means of integral valve operators. After the towers are reversed, the controller automatically starts and terminates the heating period. An 8 hour cycle is standard with 4 hours drying and 4 hours reactivation.

Automatic Tower Repressurization – At the end of the reactivation cycle, prior to tower changeover, the tower is repressurized to line pressure. This feature provides the desiccant with optimum operating conditions. Attrition and dusting are minimized and the result is longer bed life.

WARNING: Suitable air purification filters must be used to assure oil-free inlet air. Failure to do so will significantly affect dryer performance and could result in hazardous malfunction during reactivation.

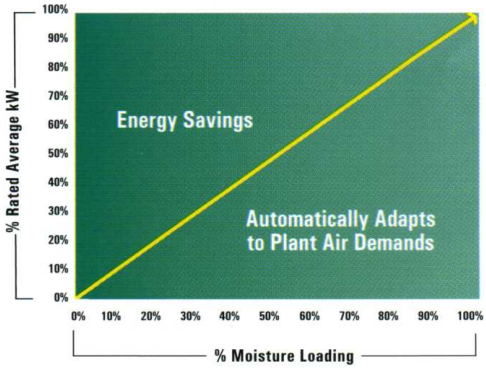
MOISTURE LOAD CONTROL

An optional Moisture Load Control System maximizes desiccant loading, reducing utility costs during periods of low moisture loading and extending desiccant life. A precision moisture analyzer with digital read-out monitors the outlet moisture dew point so that the towers are not switched until the dew point rises to an adjustable set point on the analyzer. This assures that the desiccant has reached its maximum capacity before being taken out of drying service.

A second set point on the moisture analyzer is used to indicate high dew point via panel light or remote alarm. A 4 - 20 milliamp signal is provided for customer use.

The ORIAD® 7000 Series dryer is designed to meet the demand of today's applications and is engineered to be the most energy-efficient and maintenance free dryer available in the market place.

OPTIONAL MOISTURE LOAD CONTROL SYSTEM



THE ORIAD® DRYER – VALUE ENGINEERED

The ORIAD® 7000 Series is made up of components that have been appraised as to their function and value to the total system. For unique applications and custom systems, components are selected and tailored for the specific requirements of a process. The result, efficiency, economy and performance with minimal operator attention and maintenance is the ORIAD® philosophy.

THE HEATERS

- Low watt density heating elements ensure long life
- Flexible design for "Bottom-up" installation means no overhead clearance is needed
- Elements are installed into individual stainless steel heater tubes for added element life, easy access for inspection or replacement and extend desiccant life

THE FILTRATION

Energy-efficient Oriad dryers come standard with deep pleated KDF Series filtration. Known for low resistance to flow, energy savings of 1% to 2% are realized through reduced system pressure requirements.

Coalescing Filters

A well designed compressed air or gas system requires that sufficient prefiltration be used prior to the desiccant dryer. Filtering the compressed air before the desiccant dryer is recommended to remove oil and water aerosols. This prefiltration will prevent excessive moisture load on the desiccant bed and will remove oil aerosols that could reside on the desiccant impairing proper drying performance. The superior design of the filter cartridge allows for a low pressure drop that will save thousands of dollars per year in compressor operating costs.

The KDF coalescing filter is rated for removal of contaminants down to 0.3 microns at 99.9% efficiency.

Particulate Filters

Kemp's high temperature afterfiltration removes fine particle material from the gas stream. Positioned downstream of a desiccant dryer or ahead of sensitive air or gas using devices, the KDF particulate filter prevents desiccant fines, pipe scale, rust and other solid contaminants from causing expensive downtime and maintenance.

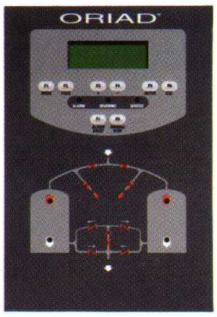
(Removal of particulates as low as 3 microns at 98% efficiency.) The high temperature particulate is rated for removal of particulates as low as 1 micron at 98% efficiency.

THE CONTROLLER

The state-of-the-art controls and diagnostics provided on this new series:

Monitor	Control	Diagnostic	Service Due
Dryer Status	Drying	Valve Switching Failure	Change Filters
Temperatures	Regeneration	Heater Over Temp.	Check Valves
Dewpoint (Optional)	Humidity	Heater Under Temp.	Check Desiccant
	Cool Down	High Humidity	

The information center is an LCD display with an 80 character, multi-line, back lit readout in 1 of 5 programmable languages. RS-232 serial port communication is standard. RS-485, fiberoptics or customer specified PLC controllers are available options.



THE VALVES

3" and Below - Diaphram Style

Kemp's diaphram valves offer large seat openings permitting greater flows and lower pressure loss. The valves are non-lubricated and pneumatically operated for positive control. For ease of maintenance, the valves are serviceable in-line.

4" and Above - Butterfly Style

Kemp's butterfly valves leverage all of the traditional benefits of high performance wafer valves. Kemp's advantage is in the vane type actuator with these featured benefits:

1. Integral vane/shaft means only one moving part
2. No cranks or gears to repair

The result of Kemp's selection of standard valves is durability, long life and low maintenance. For special applications, we offer many other valve options; higher pressure ratings, material selection, position indicators, limit switches, and manual overrides.

THE ORIAD® DRYER – FEATURES AND SPECIFICATIONS

Model Number	React. Heater Rated kWH (460v)	Average kWH*	React. Purge scfm	Dimensions H	W inches	D	Inlet/Outlet Connections	Approximate Shipping Weight lbs.
7010	2.92	2.01	3	121	77	42	1½" NPT	1275
7020	4.37	3.00	5	124	86	45	1½" NPT	1920
7030	5.83	4.01	7	126	90	48	2 NPT	2646
7040	8.75	6.02	11	137	55	87	3 FLG	3600
7050	14.58	10.02	17	136	94	55	3 FLG	4600
7060	20.41	14.03	24	149	110	59	4 FLG	6100
7070	32.07	22.05	38	149	114	70	4 FLG	9580
7080	37.91	26.06	45	164	133	86	6 FLG	10050
7090	43.74	30.07	48	164	140	86	6 FLG	11500
7100	46.65	32.07	55	164	140	86	6 FLG	12500
7110	64.15	44.10	75	164	145	92	6 FLG	14100

*Average KWH based upon 8 hour NEMA cycle. All data subject to change without notice.
Maximum Operating Pressure: 135 psig
Minimum Operating Pressure: 60 psig
Outlet Dewpoint: -40°F to -100°F. Meets or exceeds requirements for ANSI/ISA S7.3-1975 Quality Standards for Instrument Air
Consult factory for high pressures

SIZING AND SELECTION

To select the correct ORIAD® 7000 Series dryer for your application, it is necessary to know the air flow in standard cubic feet per minute (SCFM) and then adjust the flow based on inlet air temperature and inlet air pressure. A few degrees difference in the inlet air temperature substantially changes the moisture content and hence the drying requirements. Inlet air pressures also affect the ability of air to hold moisture and must be considered when selecting the proper dryer size. In addition to moisture removal, the velocity through the bed is critical for adequate contact time and proper drying. The following procedure will help you select the right dryer for the proper contact time and the correct moisture removal to meet your specific requirements.

Example:
Requirement: 2,000 SCFM, 110°F and 90 PSIG inlet conditions.
Corrected CFM – 2,000 SCFM x 1.34 (temp. factor) = 2,680 Corrected CFM.

Using this corrected CFM for moisture removal refer to the selection table and select the column labeled 110 PSIG, proceed down this column until the flow shown meets or exceeds your corrected 2,680 CFM flow requirement. Now proceed across this line to the 100 inlet pressure column for the proper contact time; if the capacity shown meets or exceeds your actual (2,000) SCFM (not corrected CFM) this is the correct selection. If your standard SCFM is larger than the capacity shown you must proceed down this column until the capacity meets or exceeds your standard CFM.

In this example, the criteria for moisture would select a Model 7080; the second criteria for contact time indicates Model 7090 is correct.

CORRECTION FACTOR

Temperature	110	105	100	95	90
Correction Factor	1.34	1.16	1	0.86	0.74

SELECTION TABLE

SCFM Inlet Capacities Various Inlet Pressures (psig)

Model Number	80	90	100	110	125
7010	160	175	190	210	235
7020	260	285	310	340	380
7030	375	410	450	490	550
7040	590	650	710	775	870
7050	930	1025	1120	1220	1370
7060	1350	1490	1630	1775	2000
7070	2070	2285	2500	2720	3050
7080	2340	2585	2830	3080	3450
7090	2670	2950	3225	3510	3935
7100	2990	3300	3610	3925	4400
7110	4060	4490	4910	5340	5990

Assumption: Air @ 100°F & 100psig

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Specifications may change without notice.

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