



# HeatSink™

REFRIGERATED COMPRESSED AIR DRYERS

WITH  
TRUE-CYCLING™ OPERATION

75 – 2,400 scfm Capacity Models



STAINLESS STEEL  
HEAT EXCHANGERS



*Compressed air is a versatile energy resource ideal for production processes and powering tools and equipment, valves, and instruments. The compression process itself causes concentrations of water, compressor lubricant aerosols, and air-borne particulates and vapors to increase to levels that can stop production, increase maintenance requirements or spoil finished product. HeatSink™ refrigerated dryers remove these contaminants and provide a consistent dew point while consuming only the electricity necessary to meet the actual air treatment demand.*

## ***Reliability. Efficiency. Innovation.***

### ***True-Cycling™ – The ZEKs Advantage***

True-Cycling is not just a catchy phrase, it is the way the HeatSink™ dryers operate. ZEKs has taken the customer's requirements for tight dew point control, rugged reliability, and low operating cost, and designed the world's most advanced cycling refrigerated air dryers. The ZEKs True-Cycling dryer is THE STANDARD by which all dryers are measured.

Common manufacturing practices, process machinery cycling, and changing production requirements result in variable compressed air volume use. This, combined with lower ambient and inlet air temperatures, results in a reduced load on the dryer. ZEKs pioneered the design of a dryer that includes a refrigeration system in conjunction with a thermal mass that efficiently stores cold energy. This allows the refrigeration compressor to cycle OFF during periods of reduced load while the dryer continues to remove moisture and contaminants from the air stream. The refrigeration system in a non-cycling dryer operates continuously which greatly increases its operating cost compared to a True-Cycling dryer.

### ***Reliable Operation***

A refrigeration system and thermal mass produce stored cold energy that is used to cool compressed air as it passes through HeatSink dryers. Cooling causes moisture and contaminants to condense so they can be removed from the air stream in a high efficiency separator and then be automatically discharged through a timed drain for disposal. Compressed air is warmed as it leaves the dryer to eliminate pipe sweating and to maintain air

system efficiency. The dryer refrigeration system automatically cycles ON and OFF to maintain cold energy as required while active circulation of the cold storage media further optimizes air drying efficiency.

Since ZEKs invented True-Cycling dryers in 1959, there have been many attempts to duplicate its superior performance. Other companies have utilized sand, refrigerant, aluminum, etc. for the storage media. Since the specific heat of these mediums is much less than the ZEKs propylene glycol/water mixture, they require as much as five times the weight of the media to approach the performance of the ZEKs design. If the thermal storage of the media is limited, the result will be varying dew points and/or excessive refrigeration compressor cycling. True-Cycling has been proven for over forty years. Due to the fact the refrigeration compressor operation is dramatically reduced, there is less wear and tear on the system.



### ***Energy Savings Up To 80%***

True-Cycling operation enables HeatSink air dryers to provide significant energy savings when compared to non-cycling dryers. Air treatment cost is not wasted through continuous operation of the dryer refrigeration system as it is with non-cycling dryers. Changes in compressed air consumption resulting from variable shift and process demands as well as daily and seasonal fluctuations in ambient temperature provide tremendous energy saving opportunities. In many applications installation of a HeatSink dryer can save as much as 80% of the operating cost of a non-cycling dryer.

# Best-In-Class

HeatSink™ air dryers are engineered to maximize operating efficiency and enable a long, trouble-free service life in a broad range of compressed air applications. HeatSink™ stands tall when compared to other refrigerated air dryers.



Recognized by leading industry professionals.

## The Standard of Excellence For Heat Exchanger Design

ZEKS patented CFX® stainless steel Corrugated, Folded heat eXchangers have been engineered exclusively for compressed air drying to include a high heat transfer coefficient and industry-leading low pressure drop. A multi-path flow area that is 3-5 times that of the equivalent copper tube exchanger, combined with continuous self-cleaning action, minimizes fouling potential. Corrosion resistant 304L stainless steel is used in all air circuit exchangers. CFX® provides durability in environments where copper or other metals are not suitable.

### CFX® = Benefits

- 100% Stainless Steel Construction
- Less Prone To Fouling Than Copper Or Aluminum Exchangers
- Flow Area That Is 3 – 5 Times That Of Competitive Exchangers
- Industry-Leading Low Pressure Drop
- Higher Energy Efficiency Than That Of Competitive Exchangers
- ZEKS Exclusive 10-Year Warranty

**CFX**  
Stainless Steel  
Heat Exchangers



(Diagram depicts exchanger cross section)

Protected under U.S. Patent  
Nos. 6,186,223 and 6,244,333

### Low Pressure Drop

The unique CFX® design has allowed ZEKS to provide air treatment with an extremely low pressure drop. This minimizes the overall compressed air energy requirement and the need for greater air compressor capacity.

### Reliable Refrigeration System

Refrigeration system components are sized to handle the maximum moisture loading for each HeatSink™ model. Condensers have been selected to maintain efficiency in all environments and they are positioned to avoid accumulation of dust and debris. High quality fully hermetic compressor life is maximized because of cycling dryer operation. Refrigeration lines include valves for convenient maintenance.

### Precooler/Reheater

The 75-2,400 scfm HeatSink™ models include a CFX® stainless steel precooler/reheater that enhances the efficiency of the dryer and optimally conditions the air for use. Compressed air is warmed to approximate ambient temperature to eliminate pipe sweating.

### Durable Construction

Internal structural pieces are heavy gauge galvanized steel. Full cabinet is powder-coated with removeable panels for convenient access to all internal components.

## HeatSink™ Standard and Optional Features Groups

### Standard:

- Stainless Steel CFX® Heat Exchangers
- Fully Hermetic Refrigeration Compressor
- Digital Performance Control (optional on the 75-150)
- High Efficiency Moisture Separator
- Timed Electric Condensate Drain
- Food-Grade Propylene Glycol Thermal Storage Media
- Water Cooled or Air Cooled Condensers (air cooled only on the 75-150)
- Thermal Storage Circulation Pump
- NEMA 1 Electrics
- Full Powder-Coated Cabinet
- Galvanized Internal Structure

### Optional:

- Digital Compressed Air Temperatures and Pressures
- Complete Stainless Steel Air Circuit
- Prefilter and Afterfilter To Meet Application Requirements
- CME™ Cold Mist Eliminator – 99% removal of air compressor lubricant carryover (available on the 200-400)
- High Condensate Level Alarm
- NEMA 4/12 Electrics
- Automatic Demand Drain
- Refrigeration Condenser Filter



### Digital Performance Control

HeatSink™ dryer operation is automatically controlled to optimize air treatment and manage energy consumption. The digital performance controller which is optional on the 75-150 models and standard on the 200-2400 models combines PLC technology with an integrated HMI (human machine interface). It includes a LCD display with 16 illuminated characters and a keypad that is convenient to access on the dryer front. These dryer functions are easily monitored and adjustments can be made to optimize air treatment:

Digital Display of:	HeatSink™ Model			
	75-150	200-400	500-800	1000-2400
• Chiller Temperature	0	S	S	S
• % Energy Savings	0	S	S	S
• Refrigerant Suction Pressure	S (Gauge)	S (Gauge)	S (Gauge)	S
• Refrigerant Suction Temperature	NA	0	0	S
• Refrigerant Discharge Pressure	NA	0	S	S
• Dryer Compressor Running Time	0	S	S	S
• Dryer Running Time	0	S	S	S
• Diagnostic Memory	0	S	S	S
• Air Pressure and Temperature	NA	0	0	0
Condensate Drain Time Adjustment	0	S	S	S
Automatic Dryer RESTART	0	S	S	S
Remote Dryer START/STOP	0	S	S	S
Remote Communication-Ready	0	S	S	S
Condensate Level Alarm-Ready	0	S	S	S
Auto. Refrig. Compressor Heater Delay	NA	NA	NA	S

S - Standard Feature      0 - Optional Feature      NA - Not Applicable

### Exclusive Warranty Coverage

In addition to the standard dryer warranty, the compressor is warranted for five years. The CFX® heat exchangers are covered for 10 years – a testament to its reliability.

**Legendary Reliability**  
*from the Inventors of Cycling Dryers*

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The example below calculates the annual energy savings of a HeatSink dryer compared to a non-cycling design. The factors can be replaced with those of any compressed air system.

**A. Determine Maximum Capacity of The Dryer**

Assume a maximum capacity of 1000 scfm for this example

**B. Determine Weekly Compressed Air Volume**

Multiply the number of hours worked per week on all shifts times the compressed air volume (scfm x 60 min.) used on each shift. Total all shift numbers to determine the actual compressed air volume used per week:

Shift	Hours	(60 min.)	scfm	Air Volume
FIRST	35	x 60	x 800	= 1,680,000
SECOND	35	x 60	x 600	= 1,260,000
THIRD	35	x 60	x 400	= 840,000
SATURDAY	7	x 60	x 200	= 84,000
<b>Weekly Compressed Air Volume</b>				<b>3,864,000</b>

**C. Calculate Weekly Air Treatment Potential of The Dryer**

Multiply the total number of hours per week (168 assuming the equipment is ON, 24/7) times the maximum capacity of the dryer:

**Weekly Air Treatment Potential = 168 hrs. x 1,000 scfm x 60 min. = 10,080,000**

**D. Calculate The Plant Operation Factor**

Divide the total compressed air volume used per week by the total weekly air treatment potential to determine the plant operation factor:

**Plant Operation Factor =  $\frac{3,864,000}{10,080,000} = .383$**

**E. Select Ambient Air Temperature Reduction Factor**

The factor varies based on geographic location and takes into account the impact of lower ambient temperatures on energy consumption. Typical factors are:

**Northern US Climate –.24    Central US Climate –.31    Southern US Climate –.34**

**F. Calculate Utilization Factor**

This incorporates all of the above:

**Plant Operation Factor x Ambient Air Temperature Reduction Factor**

If we assume the plant is in the Southern US, the Utilization Factor will be:

**Utilization Factor = .383 x .34 = .13 (13%)**

**G. Estimate Annual Savings**

Refer to the following table for a 1000 scfm dryer and interpolate between a 10% and 20% utilization factor:

**Estimated Annual Savings (\$) From True-Cycling Operation\*** (Based on \$.10/kWh)

Dryer Size (scfm)	Utilization Factor					
	10%	20%	30%	40%	50%	60%
75HSG	520	451	383	314	245	177
100HSG	825	740	656	571	487	402
125HSG	994	876	758	640	521	403
150HSG	999	886	773	659	546	433
200HSG	1345	1200	1054	908	762	617
250HSG	1218	1042	867	691	515	339
300HSG	1633	1410	1187	964	741	518
400HSG	2767	2484	2200	1917	1633	1349
500HSF	2752	2356	1960	1564	1168	772
600HSF	3522	3100	2678	2255	1833	1411
700HSF	4210	3704	3197	2690	2183	1676
800HSF	4334	3765	3196	2626	2057	1488
1000HSF	4824	4209	3594	2978	2363	1747
1200HSF	5876	5112	4349	3585	2821	2058
1600HSF	7646	6641	5635	4629	3623	2617
2000HSF	7628	6474	5319	4165	3011	1857
2400HSF	10050	8798	7546	6294	5042	3790

\*Consult factory for calculation details

Results shown for air cooled models

Heat load on refrigerated compressed air dryers is based on the combination of inlet air flow volume, inlet air temperature, ambient air temperature, and compressed air pressure. Of these, inlet air flow volume (scfm) and inlet air temperature have the greatest effect. Even a slight reduction of inlet air temperature will greatly reduce the heat load on a dryer. Dryer model selection is based on capacity sufficient to handle the heat load during the hottest months of the year. Cycling operation provides the greatest way to realize energy savings as inlet air temperature drops.

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# HeatSink™ Sizing and Selection

HeatSink™ dryers are rated in accordance with Compressed Air and Gas Institute (CAGI) Standard ADF-100, for air with 38°F pressure dew point (PDP) at the following conditions: 100°F inlet air temperature; 100 psig inlet air pressure; 100°F ambient air temperature. Select a model that has the required treatment capacity (scfm) from the Technical Specifications Chart below.

Use the following Correction Factors to select a model that provides 38°F PDP for an application that deviates from the standard rating conditions (Selection example provided):

Dryer Selection Example		Inlet Air Temperature	Correction Factor	Inlet Air Pressure	Correction Factor	Ambient Air Temperature	Correction Factor
Air Volume Requirement:	375 scfm	80°F	.61	50 psig	1.29	80°F	.80
Inlet Air Temperature:	110°F	90°F	.79	75 psig	1.10	90°F	<b>.89</b>
Inlet Air Pressure:	150 psig	100°F	1.00	100 psig	1.00	100°F	1.00
Ambient Air Temperature:	90°F	110°F	<b>1.23</b>	150 psig	<b>0.86</b>	110°F	1.16
		120°F	1.51	250 psig	.79	120°F	1.30

With the correction factors selected, corrected scfm can be calculated:

$$1.23 \times .86 \times .89 \times 375 \text{ scfm} = 353 \text{ scfm corrected}$$

Select the HeatSink™ model that matches or exceeds the corrected treatment capacity (scfm). For the example given, it is a model 400HSG delivering 38°F PDP.



Overall dimensions indicated.

Air, electric service, and drain connection configurations vary per model. Contact factory for details.

## HeatSink™ Technical Specifications

MODEL	CAPACITY*		DIMENSIONS			SHIP WT.		AIR CONNECT	DRAIN CONNECT	REFRIG COMP		OPERATING KW***		REFRIG TYPE	MAX WORKING PRESSURE †	VOLTAGES
	SCFM	38°F	W IN.	D IN.	H IN.	AIR COOL LBS.	WATER COOL LBS.	IN/OUT	FPT	AIR COOL HP	WATER COOL HP	AIR COOL	WATER COOL		PSIG	
75HSG	75	1.5	14	35	31	265	NA	1" MPT	1/4"	.4	NA	.78	NA	R404	300 psig	115-1-60 208/230-1-60 220-1-50
100HSG	100	2.1	14	35	31	265	NA	1" MPT	1/4"	.5	NA	.96	NA	R404	300 psig	
125HSG	125	1.9	14	35	31	300	NA	1 1/2" MPT	1/4"	.8	NA	1.35	NA	R404	300 psig	
150HSG	150	2.6	14	35	31	300	NA	1 1/2" MPT	1/4"	1.0	NA	1.29	NA	R404	300 psig	
200HSG	200	1.6	28	30	58	620	540	1 1/2" MPT	1/4"	1.3	1.3	1.66	1.06	R404	300 psig	208/230-3-60 220-3-50 460-3-60 380-3-50 575-3-60
250HSG	250	2.7	28	30	58	670	570	1 1/2" MPT	1/4"	1.5	1.5	2.01	1.39	R404	300 psig	
300HSG	300	2.1	28	30	58	735	630	2" MPT	1/4"	2.0	2.0	2.54	1.65	R404	300 psig	
400HSG	400	2.9	28	30	58	745	670	2" MPT	1/4"	2.5	2.5	3.24	2.19	R404	300 psig	
500HSF	500	2.9	42	40	62	1105	1120	3" MPT	1/4"	3.5	3.5	4.52	2.80	R404	300 psig	208/230-3-60 220-3-50 460-3-60 380-3-50 575-3-60
600HSF	600	3.0	42	40	62	1275	1270	3" MPT	1/4"	4.0	4.0	4.82	3.14	R404	300 psig	
700HSF	700	2.7	42	40	62	1320	1300	3" MPT	1/4"	4.5	4.5	5.79	3.58	R404	300 psig	
800HSF	800	2.9	42	40	62	1415	1300	3" MPT	1/4"	5.0	5.0	6.50	4.16	R404	300 psig	
1000HSF	1,000	2.4	32	72	69	2315	2355	4" FLG	1/4"	6.0	5.0	7.03	4.48	R22	220 psig	220-1-50
1200HSF	1,200	3.1	32	72	69	2435	2435	4" FLG	1/4"	8.0	6.0	8.72	5.48	R22	220 psig	
1600HSF	1,600	3.3	32	72	69	2785	2615	4" FLG	1/4"	10.5	8.0	11.48	7.34	R22	220 psig	
2000HSF	2,000	3.5	32	91	90.68‡	3925	3925	6" FLG	1/4"	13.0	10.5	13.18	9.09	R22	220 psig	
2400HSF	2,400	3.5	32	91	90.68‡	4150	4015	6" FLG	1/4"	13.0	10.5	14.29	9.59	R22	220 psig	

\* Performance data obtained and presented in accordance with CAGI Standard No. ADF 100, "Refrigerated Compressed Air Dryers – Methods for Testing and Rating." Pressure dew point at 100 psig inlet air pressure, 100°F inlet air temperature, 100°F ambient air temperature.

\*\* Pressure drop ±.5 psi

\*\*\* Average kilowatts per hour of dryer operation at full rated capacity

† Maximum working pressure is limited to drain rating

‡ Air cooled dimension. Water cooled dimension 76.12"

NEMA 1 electrical enclosures standard.

Dimensions subject to change without notice.

Standard 75-800 scfm models ETL-Certified

1000-2400 models UL 508 Panels.

NA indication - Not Applicable

Protected under U.S. Patent  
Nos. 6,186,223 and 6,244,333

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75 – 2,400 scfm



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