KAESER COMPRESSORS®

Built for a lifetime.

Regenerative Desiccant Dryers

KAD, KED, and KBD Series

40 to 5400 cfm

kaeser.com

Desiccant Air Dryers

The right dryer for you

Most compressed air applications can achieve the required air quality by using a refrigerated dryer in combination with proper filtration. For those cases where compressed air is exposed to freezing temperatures or where the product, process, or equipment is highly sensitive to moisture, KAESER offers a complete line of desiccant dryers specifically designed to meet low dew points and deliver energy savings.

Innovation you can trust

With a cutting edge research and development team committed to building industry-leading products, KAESER continues to deliver better solutions to meet our customers' compressed air needs. KAESER's expertise and world-wide reputation for superior reliability and efficiency offer great performance and peace of mind.

Quality in every detail

Desiccant dryer performance and reliability are driven by component quality. KAESER's valves and actuators are designed for consistent dew point performance and low pressure drop. Additionally, desiccant bed symmetry is selected to ensure uniform flow distribution and maximize contact time, while the spherical activated alumina desiccant allows for long service life and minimizes dusting. A high surface-to-volume ratio and great affinity for water vapor yield superior adsorption.

Savings with proper application

Desiccant dryers have a higher purchase price and operating costs than refrigerated dryers and should be applied to the portions of a system requiring low dew points. Our system design team will help you size and select the dryer to deliver air quality suitable for you application with the lowest life cycle costs.

The benefits of counterflow regeneration

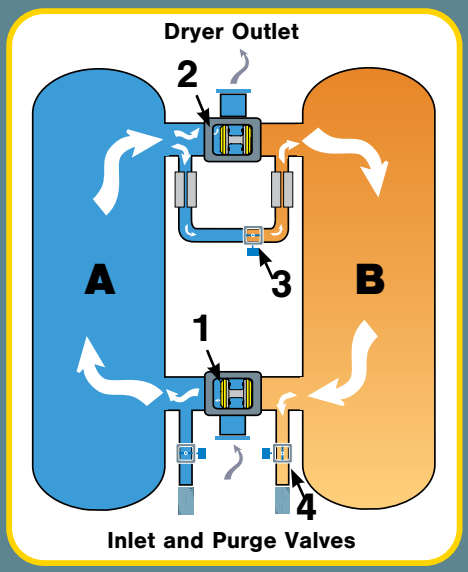
Regardless of design, liquid water will accumulate in the piping between the prefilters and the dryer inlet. Eventually, the air stream will carry a "slug" of water into the desiccant bed. With the inlet at the bottom of the tower, our upflow drying design minimizes the accumulation of liquid water in the desiccant beds.

Counterflow design ensures that the driest portion of the desiccant bed is nearest the dryer outlet at switchover, and allows purge air to be evenly distributed throughout the desiccant bed, providing more effective regeneration.

Desiccant dryer basic operation

KAESER desiccant dryers use the principles of adsorption and desorption and alternately cycle the compressed air through twin desiccant towers. As the vapor-laden air flows through one tower, the moisture is adsorbed onto the desiccant. Meanwhile, in the other tower, "purge air" flows through, evaporates the water off the desiccant, and carries it out of the tower as vapor.

The process starts with the air entering the inlet switching valve (1) which diverts the air into the drying tower (A). The tower, filled with desiccant, adsorbs the water from the compressed air. The air then exits the dryer through the outlet switching valve (2). Air is also diverted through the purge line, reduced in pressure by orifices and the purge adjusting valve (3), to the regenerating tower (B), and out the dryer through the purge valve (4). This stream of air is the purge air that sweeps the moisture off the spent desiccant so it can be used again. The towers then switch and the operation continues to dry the air and regenerate the desiccant bed.

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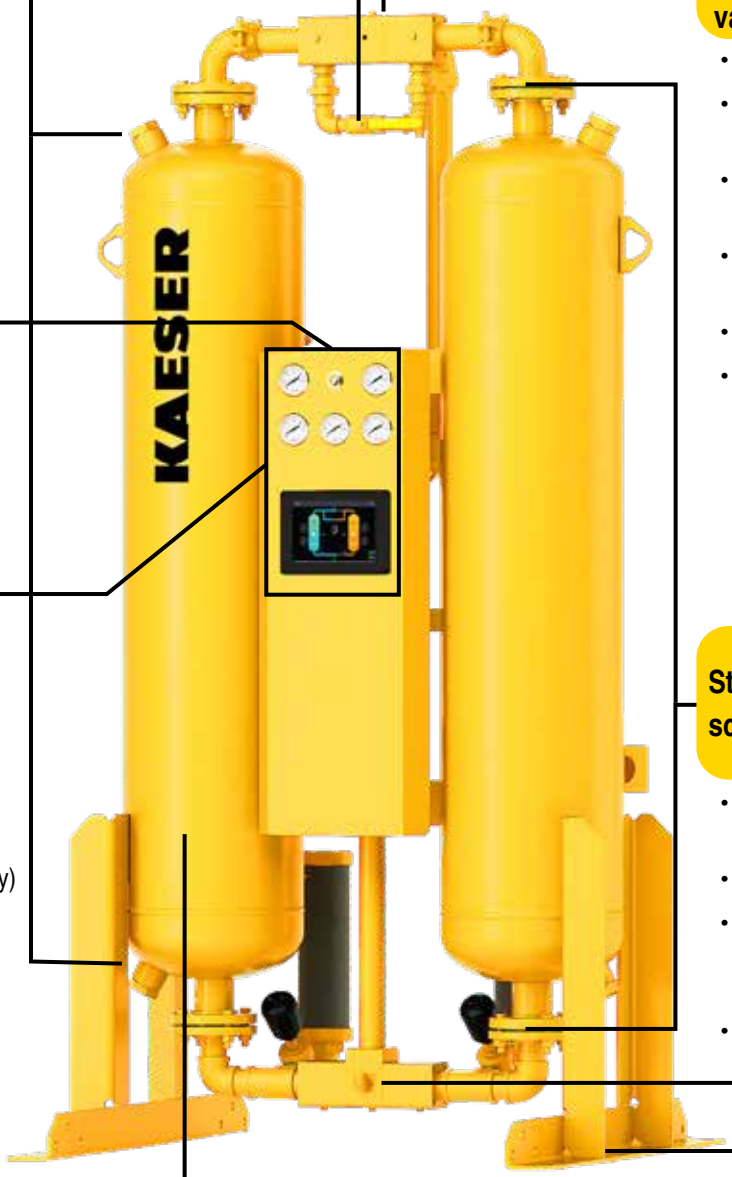
CAUTION

Heatless desiccant dryer (KAD)

KADs produce pressure dew points as low as -94°F at rated conditions (see Dew Point Options on page 5).

Sizes: 40 – 5400 scfm



Purge adjusting valve

- Easily adjust purge flow to proper setting to minimize air consumption

Separate top fill and bottom drain ports

- Easy desiccant removal and replacement

Inlet and outlet shuttle valves

- Nylon shuttle
- Tested to over 500,000 cycles
- Corrosion resistant aluminum housing
- Single moving part has very long life
- No maintenance
- No check valves

Moisture indicator

- Color change indicates elevated outlet dew point

Controls and instrumentation

- Tower pressure gauges
- Tower status
- Switching failure alarm (EC3 only)
- Purge flow indicator
- NEMA 4X electrical enclosure
- Modbus TCP connection (EC3 only)

Stainless steel support screens and air diffusers

- Located internally at top and bottom of each vessel
- Easy to remove and clean
- Efficiently filters out large contaminants and protects outlet shuttle valve
- Effectively prevents channeling

ASME pressure vessels

- Fabricated per Section VIII of the boiler and pressure vessel code
- ASME safety relief valve

Structural steel frame complete with floor stand for easy installation

- Lifting lugs for easy handling
- Optional factory mounted of pre- and after-filters

KAD heatless desiccant dryer specifications (Table 1)

All Models	Inlet Flow @ 100 psig (scfm)	Purge Rate @ 100 psig (scfm)		Power Supply	Dimensions* W x D x H (inches)	Inlet and Outlet Connection* (inches)	Wt.* (lb.)	Filter Package Capacity (scfm)	Total Replacement Desiccant (lb.)
		Avg	Max						
KAD 40	40	5.8	7	90-305 V 1 Ph 50 or 60 Hz	35 x 35 x 49	1 NPT	365	55	52
KAD 60	60	8.6	10.5		35 x 35 x 63	1 NPT	445	75	80
KAD 90	90	13	15.8		37 x 35 x 81	1 NPT	575	90	110
KAD 115	115	16.6	20.1		50 x 41 x 57	1 NPT	685	160	210
KAD 165	165	23.8	28.9		50 x 41 x 57	1 NPT	685	290	210
KAD 260	260	37.4	45.5		51 x 41 x 75	2 NPT	1010	290	318
KAD 370	370	53.3	64.8		58 x 42 x 65	2 NPT	1215	390	458
KAD 450	450	64.8	78.8		58 x 42 x 73	2 NPT	1350	500	542
KAD 590	590	85	103		55 x 51 x 104	2 NPT	1473	625	710
KAD 750	750	108	131		57 x 51 x 107	2 NPT	2134	1250	910
KAD 930	930	134	163		63 x 59 x 112	2 NPT	2414	1250	1180
KAD 1130	1130	163	198		66 x 59 x 115	3 FLG	2875	1250	1420
KAD 1350	1350	194	236		68 x 59 x 120	3 FLG	3722	1875	1846
KAD 1550	1550	223	271		74 x 59 x 117	4 FLG	4167	1875	2064
KAD 2100	2100	302	368		82 x 59 x 119	4 FLG	4417	2500	2520
KAD 3000	3000	432	525		86 x 67 x 125	4 FLG	9010	3125	3734
KAD 4100	4100	590	718		100 x 88 x 124	6 FLG	9900	5000	5398
KAD 5400	5400	778	945		105 x 89 x 124	6 FLG	12000	6875	7200

Note 1: KAD dryer inlet flow capacities are established in accordance with ISO 7183 Option A2: Inlet air pressure 100 psig, inlet air temperature 100°F, saturated.

Note 2: The purge flow rate of any pressure swing (heatless) desiccant dryer is not constant throughout the purge cycle. The purge cycle consists of a maximum purge flow period when the purge valve is open and a reduced flow period during repressurization. The total air consumption during the purge cycle is the average purge flow and is based on a 10 minute cycle time (-40°F PDP).

Note 3: Maximum working pressure: 150 psig standard; 250 psig optional. Maximum working pressure to 500 psig available for most models. Consult factory.

*Dryer only. See drawing for inlet/outlet connection size for dryer with filter package. Weight is dryer only. Dryer shipping weight appears on drawing. For shipping with a filter package, consult factory.

KAD capacity correction factors

To determine a dryer's inlet flow capacity at inlet pressures other than 100 psig, multiply the dryer's rated inlet flow found in Table 1 by the multiplier from Table 2 next to the inlet pressure.

KAD dew point options meet ISO 8573.1 air quality standards

KAD with EC3 controls allow the user to select outlet pressure dew points corresponding to the different ISO 8573-1 air quality classes.

KAD E models are preset to deliver the commonly used ISO 8573-1 Class 2 outlet pressure dew point.

Specifications are subject to change without notice.

(Table 2)

Inlet Pressure (psig)	Multiplier	Inlet Pressure (psig)	Multiplier
60*	0.65	125	1.10
70	0.74	130	1.12
80	0.83	140	1.16
90	0.91	150	1.20
100	1.00	175	1.29
110	1.04	200	1.37
115	1.06	225	1.45
120	1.08	250	1.52

**For operation at pressures lower than 60 psig, please contact factory.*

Example:

Compressor flow = 250 cfm
Minimum pressure = 90 psig
Correction factor for 90 psig is 0.91

Multiply the correction factor to the KAD rated capacity. KAD 370 used.

370 scfm x 0.91 = 337 scfm

The dryer's corrected inlet flow capacity is greater than the compressor flow so the KAD 370 can be used.

(Table 3)

ISO 8573-1 Class	Dew Point	Cycle Time and Mode	
		Standard	Demand Mode
1	-94°F (-70°C)	4 min. fixed	N/A
2	-40°F (-40°C)	10 min. fixed	Yes
3	-4°F (-20°C)	16 min. fixed	Yes

Heated desiccant dryers (KED & KBD)

KAESER Heated Purge Dryers (KED) are heated regenerative dryers that use only 7% of compressed air for purging. They heat the dry purge air to increase its capacity to hold moisture and to regenerate. KED's provide lower operating costs by reducing the amount of expensive purge air used to regenerate. Standard design outlet pressure dew point at rated conditions: -4°F (-40°F with the optional purge booster).

Sizes: 300 – 3200 scfm

KAESER Blower Purge Dryers (KBD) use little or no purge air by introducing atmospheric air and heating it. The heated air has a higher capacity for absorbing water and provides effective regeneration. KBD's provide the greatest energy savings by eliminating the need to use costly compressed air for purging. Standard design outlet pressure dew point at rated conditions: -40°F.

Sizes: 500 – 4300 scfm standard. Up to 10,000 scfm available, consult factory.

Stainless steel support screens and air diffusers

- At top and bottom of each vessel
- Easy to remove and clean
- Protects outlet shuttle valve
- Effectively prevents channeling

Heater and Blower

- Insulated low watt-density heater
- Low noise regenerative blower

Moisture indicator

- Samples outlet air
- Color change indicates elevated outlet dew point

(not shown)

KED Dryer

Purge flow valve (KED only)

- Offers convenient purge rate adjustment

Controls and instrumentation

- Tower pressure gauges
- Tower status lights
- Switching failure alarm
- Purge flow indicator (KED only)
- NEMA 4 electrical enclosure
- Modbus TCP comm port

ASME vessels + relief valves

- Meets ASME BPVC Section VIII

KBD Dryer

Long life non-lubricated inlet and purge control valves standard

KED heated purge dryer specifications (Table 4)

KED Model Number	Inlet flow @ 100 psig 100°F (scfm)	Purge Flow Rate (scfm)	Heater (nom. kW)	Dimensions W x D x H (in.)	Approx. Weight* (lb.)	In/Out Connection* (in.)	Pre-filter (KB Series) (scfm)	High-Temp After-filter (HTA Series) (scfm)	Total Replacement Desiccant*** (lb.)
300	300	21	4.5	50 x 47 x 98	1400	1.5 NPT	390	400	420
400	400	28	6	55 x 53 x 104	1800	1.5 NPT	500	400	708
500	500	35	7	55 x 53 x 105	1800	2 NPT	500	600	708
600	600	42	8	57 x 53 x 108	2000	2 NPT	625	600	906
750	750	53	10	62 x 59 x 114	2400	3 FLG	1250	1200	1180
900	900	63	12	62 x 59 x 114	2400	3 FLG	1250	1200	1180
1050	1050	74	14	66 x 62 x 113	2900	3 FLG	1250	1200	1420
1300	1300	91	17	68 x 63 x 118	3400	3 FLG	1875	1800	1848
1500	1500	105	19	82 x 66 x 119	5100	3 FLG	1875	1800	2518
1800	1800	126	23	82 x 66 x 119	5100	3 FLG	1875	1800	2518
2200	2200	154	28	85 x 73 x 127	7800	4 FLG	2500	2400	3734
2600	2600	182	33	85 x 73 x 127	7800	4 FLG	3125	3000	3734
3200	3200	224	40	97 x 82 x 125	9000	4 FLG	3750	4800	4754

KBD blower purge dryer specifications (Table 5)

KBD Model Number	Inlet flow @ 100 psig 100°F (scfm)	Blower Flow Rate (scfm)	Blower (nom. hp)	Heater (nom. kW)	Dimensions W x D x H (in.)	Approx. Weight (lb.)	In/Out Connection (in.)	Pre-filter (KB Series) (scfm)	High-Temp After-filter (HTA Series) (scfm)	Total Replacement Desiccant (lb.)
500	500	94	2.5	10	55 x 59 x 109	1900	2 NPT	500	600	708
600	600	113	4	12	57 x 60 x 108	2100	2 NPT	625	600	906
750	750	140	4	14	62 x 68 x 114	2500	3 FLG	1250	1200	1180
900	900	158	4	17	62 x 68 x 114	2500	3 FLG	1250	1200	1180
1050	1050	183	5	19	66 x 70 x 113	3000	3 FLG	1250	1200	1420
1300	1300	227	7.5	23	68 x 73 x 118	3600	3 FLG	1875	1800	1848
1500	1500	281	10	28	82 x 79 x 119	5400	3 FLG	1875	1800	2518
1800	1800	317	10	33	82 x 79 x 119	5400	4 FLG	1875	1800	2518
2200	2200	403	10	40	85 x 86 x 127	8100	4 FLG	2500	2400	3734
2600	2600	449	15	45	85 x 89 x 127	8200	4 FLG	3125	3000	3734
3200	3200	552	5	53	97 x 107 x 127	9300	4/6 FLG	3750	4800	4754
3600	3600	614	7.5	58	97 x 116 x 133	12100	6 FLG	3750	4800	5222
4300	4300	732	7.5	70	109 x 123 x 132	13300	6 FLG	5000	4800	7088

Actual kW is less and proportional to the average water load presented to the dryer.
*Dryer only. See drawing for inlet/outlet connection size for dryer with filter package. Weight is dryer only. Dryer shipping weight appears on drawing. For shipping with a filter package, consult factory.
**KBD 3200 has a 4" FLG inlet and 6" FLG outlet connection. // ***See manual for replacement desiccant details

KED/KBD inlet conditions correction factors (Table 6)

Specification tables 4 & 5 show capacities at 100 psig (7 bar) inlet pressure, 100°F (38°C) inlet temperature, and fully saturated air. To determine maximum inlet flow at other conditions, multiply the inlet flow from the product specifications table by the multiplier from Table 6 that corresponds to your operating conditions.

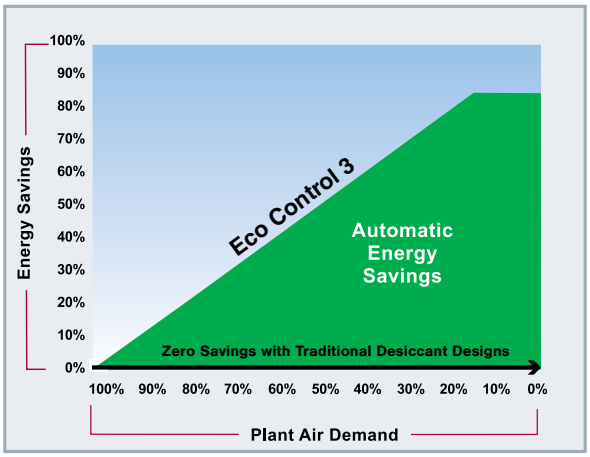
Inlet Pressure (psig)	Inlet Temperature °F (°C)						
	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)
60	1.03	1.01	0.99	0.80	0.58	0.43	0.32
70	1.10	1.08	1.07	0.94	0.68	0.50	0.37
80	1.17	1.15	1.14	1.08	0.79	0.58	0.43
90	1.24	1.22	1.20	1.18	0.89	0.66	0.49
100	1.30	1.28	1.26	1.24	1.00	0.74	0.55
110	1.36	1.34	1.32	1.30	1.11	0.82	0.61
115	1.39	1.37	1.35	1.33	1.16	0.86	0.64
120	1.42	1.40	1.38	1.36	1.22	0.90	0.67
125	1.45	1.43	1.41	1.39	1.27	0.94	0.70
130	1.48	1.46	1.44	1.42	1.33	0.99	0.74
140	1.53	1.51	1.49	1.47	1.44	1.07	0.80
150	1.58	1.56	1.54	1.52	1.50	1.16	0.87

Important:

For every 20°F inlet temperature increase, moisture load/dryer size approximately doubles. For inlet temperatures above 100°F, we ***strongly*** recommend installing a trim cooler, such as KAC or KWC before the dryer.

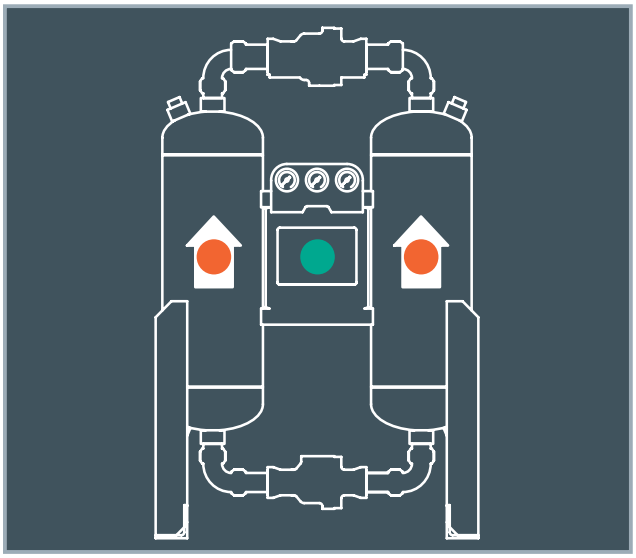
Controls and instrumentation

Eco Control 3



Heatless desiccant dryers

To precisely and automatically match purge air consumption to a changing load, KAESER offers the Eco Control 3 on heatless desiccant dryers. The Eco Control 3 monitors temperature changes within the desiccant bed when the dryer is operating at less than its full capacity. This reduces the number of purge cycles and ensures that only the necessary volume of purge air is consumed.



Basic timer control (KAD E)

The Basic Timer Control is a reliable fixed cycle timer with LED's indicating which tower is drying. This controller maintains a fixed 10-minute cycle delivering an ISO Class 2 pressure dew point (-40°F). Choose this controller when air demand is uniform and closely matches dryer capacity.

Externally heated desiccant dryers

The Eco Control 3 for heated dryers operates the dryer on a fixed cycle. A tower is on-line (drying compressed air) for half of the cycle and then taken off-line to be regenerated during the remaining cycle time. Heater operation is terminated when temperature sensors detect that desiccant bed heating is complete.

Purge booster (KED)

This option draws in ambient air to mix with compressed air to

significantly increase (nearly double) the purge flow without using more compressed air. This produces lower outlet dew points and minimizes dew point spikes, and slightly reduces compressed air consumption.

Energy Saver (KED and KBD)

The Energy Saver Option integrates moisture and temperature sensors to monitor the humidity level near the outlet end of the desiccant beds. During periods of reduced flow, the Energy Saver extends the drying cycle thereby reducing the number of regeneration cycles, saving energy. For KED models, the Energy Saver Option also includes the Purge Booster.

Energy Management (KED and KBD)

The Energy Management Option includes the Energy Saver Option above and a digital dew point monitor. This feature displays the dryer's outlet dew point and allows the user to prevent tower changeover until a user specified outlet dew point has been achieved, or lets the Energy Management determine the length of the drying period. For KED models, the Energy Management Option also includes the Purge Booster.

ECO CONTROL 3

Features

System monitoring

On-site system diagnostics

The Eco Control 3 provides comprehensive, advanced system monitoring, thanks to an extensive reporting system with event memory, detailed maintenance management, graphical display of the time curve for all temperatures and pressure dew point (optional), as well as a P&I diagram with integrated real-time data.

Dew point control

Save energy in partial load

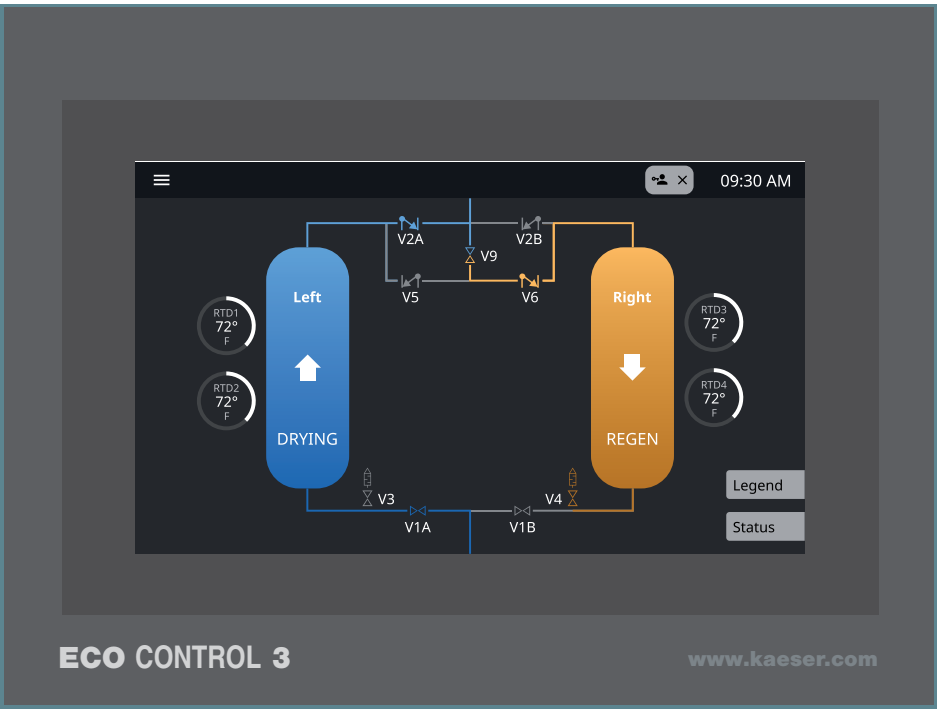
Eco Control 3 enables two control types (KAD). The standard demand control that captures the moisture load of the desiccant using maintenance free temperature sensors to adjust cycle times to achieve a pressure dew point of -40°F and reduce purge consumption. If the optional dew point sensor is installed, an individual dew point value can be set and regulated. Only after optimal utilization of the desiccant, tower switch over occurs, minimizing purge air consumption

The KED and KBD also have the option of demand control when the options Energy Saver or Energy Management Controller are installed.

Valve control

Sequence monitoring

Eco Control 3 controls and monitors the valve switching sequence. The correct sequence can also be checked in a manual test mode which helps troubleshooting.



7” touch display

Speaks your language

The Eco Control 3’s clearly structured menu and 7” touch display ensure ergonomic navigation through the controller’s menus - and is currently available in 28 languages.

Floating Contacts

External connections

Contacts are available for fault messages, warnings and operating messages (one contact for each). In addition, two contacts are available to connect the alarm messages from two condensate drains. The remote control (completion of half a cycle before shutdown) can also be operated via a separate contact.

Network connection

Pathway to the SIGMA NETWORK

The Eco Control 3 is equipped with a Modbus TCP communications module, allowing communication with PLCs and the SIGMA AIR MANAGER® 4.0 (KAD only).

USB interface

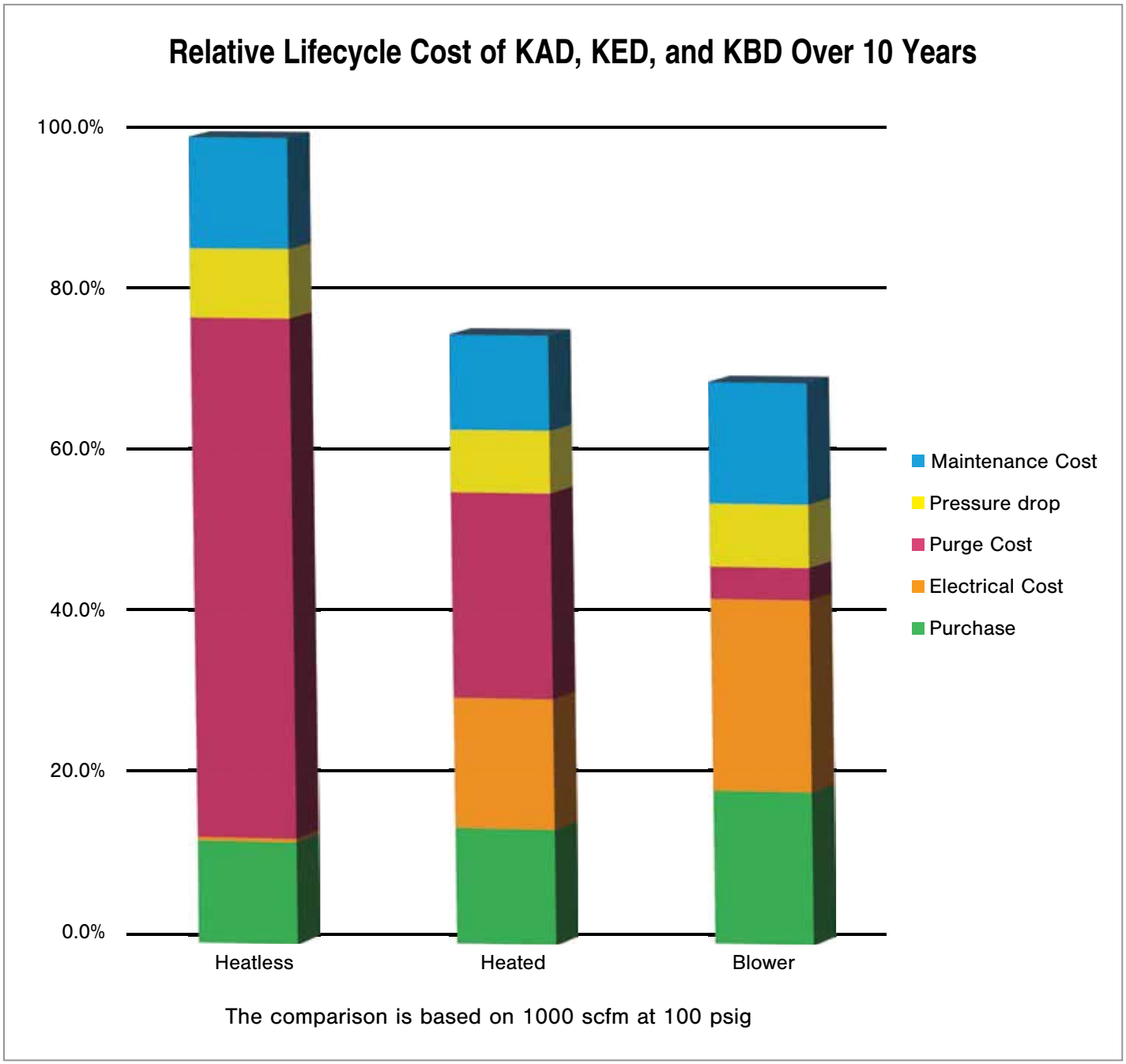
Simple updates

Controller software updates are easily made by the USB interface. USB also increases capacity to store operational messages and alarms for easy troubleshooting, system monitoring and reports on dryer operation.

Choosing the right desiccant dryer

Heatless dryers (KAD) can achieve the lowest dew points (as low as -94°F) and have lower initial cost, but have higher operating costs. Exhaust purge and blower purge dryers are more efficient, but have higher initial costs, and can only reach dew points as low as -40°F. See the charts below for comparison. When selecting desiccant dryers, assess the dew point required for your application and size the dryer for only the part of the system that needs the low dew point.

Total cost of purchase, operation, and maintenance of desiccant dryers



Options

Filtration

All desiccant dryers require proper filtration. Coalescing pre-filters prevent contamination of desiccant beds caused by oil aerosols. Particulate after-filters collect traces of desiccant dust that may exit the dryer. Maintaining these filters extends service intervals and provides excellent air quality. All KAESER desiccant dryers offer optional filter packages with or without block and bypass valves.

Insulation for heated desiccant air dryers (KED and KBD)

Insulation with protective jacket for heater and heater discharge piping is standard; however, insulation for the desiccant vessels is optional. Vessel insulation offers protection for personnel and reduces operating costs. Vessel insulation is flexible open-cell melamine foam having a permanently bonded PVC film laminated polyester fabric jacket. This insulating system absorbs impact and returns to its original shape, thus maintaining its insulating qualities.

Other options

KAD, KED, and KBD

- High humidity alarm
- Mounted dew point monitor
- Stainless steel or copper pilot and instrument air tubing and fittings
- NEMA 4 low ambient protection packages for dryer and pre-filter(s)
- Parallel piped pre-filters and after-filters with inlet/outlet isolation valves
- Silencer for purge booster

Wall-mountable heatless desiccant air dryers (DC-HF Series)

For point of use drying or other low flow applications where space is limited, KAESER offers the DC-HF wall-mounted heatless desiccant dryers. Reliable, quiet, and efficient, DC-HF series desiccant dryers are available in six models from 7 to 40 scfm. An optional wall-mount bracket is available. Pre-mounted connection adapters allow for easy installation of the included KAESER filters. Required pressure dew points (-40°F/-94°F) are met in the fixed cycle or with dew point control (optional pdp control kit). Please see the DC-HF literature for more information.

The world is our home

As one of the world's largest compressed air systems providers and compressor manufacturers, KAESER COMPRESSORS is represented throughout the world by a comprehensive network of branches, subsidiary companies and factory trained partners.

With innovative products and services, KAESER COMPRESSORS' experienced consultants and engineers help customers to enhance their competitive edge by working in close partnership to develop progressive system concepts that continuously push the boundaries of performance and compressed air efficiency. Every KAESER customer benefits from the decades of knowledge and experience gained from hundreds of thousands of installations worldwide and over ten thousand formal compressed air system audits.

These advantages, coupled with KAESER's worldwide service organization, ensure that our compressed air products and systems deliver superior performance with maximum uptime.

KAESER COMPRESSORS®

Built for a lifetime.

ISO 9001:2015
ISO 14001:2015
ISO 45001:2018
ISO 50001:2018
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