

Clean Air Treatment



Clean Air Treatment

Why Clean Air Treatment?

Dirt, water vapor and other impurities enter the compressor with the atmospheric air. During the compression process, oil (liquid and vapor) is also commonly introduced. If not removed, dirt, liquid water and oil travel downstream causing product rejects, costly production delays, and increased maintenance costs. Problems such as corrosion, scaling, pressure loss, contamination and freezing are serious and create down time for compressed air systems. They lead to production problems such as contamination of equipment, accelerated tool wear and product rejects. Kaeser offers a complete selection of clean air treatment products to prepare compressed air for the stringent requirements of many applications.

Selecting Equipment

Consider the ambient conditions in selecting and sizing dryers, filters and other clean air treatment products. Ambient air temperature, humidity and quality will directly affect the air leaving the compressor and the effectiveness of air treatment equipment. Applying correction factors for ambient temperature, compressed air temperature and pressure will ensure proper size selection.

Higher quality air can cost more to produce considering additional equipment purchases, more frequent maintenance, and higher energy consumption due to pressure drops and purge air. However, identifying and targeting applications with specific air quality requirements can actually help reduce operating costs. For applications requiring higher air quality levels, apply clean air treatment equipment at the point of use rather than the entire system.

Your Application

Your application will determine what level of air quality you need. Some of the more common applications can be found in the "Six Levels of Clean Air Treatment" section of this brochure. Other applications not shown may have similar requirements or a variation of the ones shown.

Global Standards

ISO 8573.1 was developed in 1992 by ISO (International Organization for Standardization) to help facility engineers specify compressed air quality globally with "Quality Classes" for solid particulates, humidity and oil. Quality classes provide an internationally accepted unit of measure. A typical pharmaceutical plant, for example, would have a compressed air specification of ISO Quality Class 1.2.1. This is equivalent to 0.1 micron particulate filtration, -40° F (-40°C) dew point, and 0.008 ppm (0.01 mg/m³) oil filtration.

Quality Classes	SOLIDS Maximum Particle Size (microns)	
	0	as specified
1	.01	
2	1	
3	5	
4	15	
5	40	
6	—	

Quality Classes	MOISTURE Dew Point	
	°C	°F
0	as specified	
1	-70	-94
2	-40	-40
3	-20	-4
4	3	38
5	7	45
6	10	50

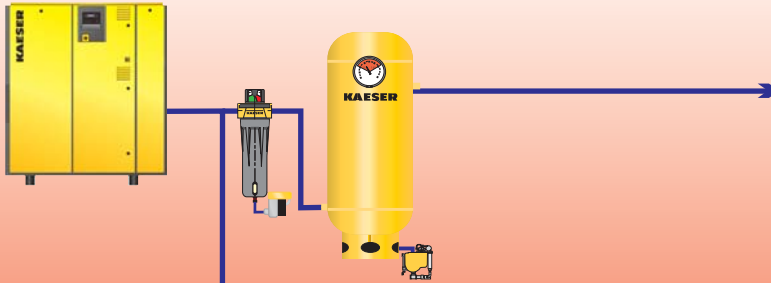
Quality Classes	OIL Liquid and Gas	
	mg/m ³	ppm _{w/w}
0	as specified	
1	0.01	0.008
2	0.1	0.08
3	1	0.8
4	5	4
5	>5	>4
6	—	—

Six Levels of Clean Air Treatment

A solution for every application!

The six levels below provide a framework for completing a compressed air system. Each level progresses to

cleaner and purer air by removing finer amounts of contamination, water, oil aerosols, and oil vapors. Note the location of each product and then look on the following pages for the function and capabilities of each.

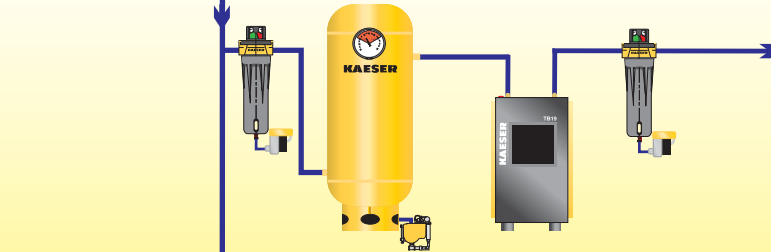


Level 1

Filtered Centrifugal Separator removes all solids three microns and larger. Removes liquids: 99% of water droplets, 40% of oil aerosols.

ISO 8573.1 Quality Class: 3.6.5

Application: Primary stage for all compressed air treatment levels

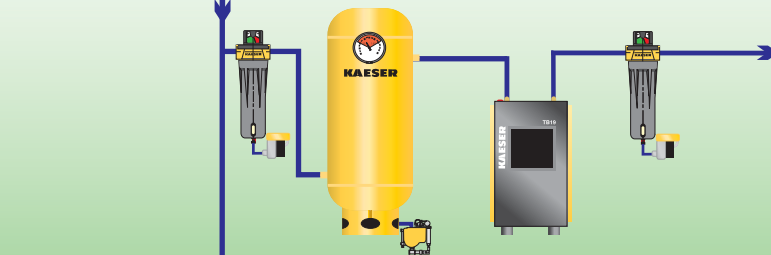


Level 2

Refrigerated Compressed Air Dryer produces pressure dew points as low as 35°F. **Air Line Filter** removes 70% of oil aerosols and all solid particles one micron and larger.

ISO 8573.1 Quality Class: 2.4.4

Applications: Air Tools, Sand Blasting

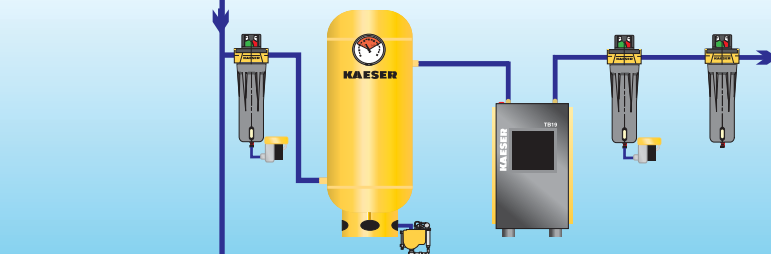


Level 3

Refrigerated Compressed Air Dryer produces pressure dew points as low as 35°F. **Oil Removal Filter** removes 99.999% of oil aerosols and all solid particles .025 microns and larger.

ISO 8573.1 Quality Class: 1.4.2

Applications: Instrument Air, Paint Spraying, Powder Coating

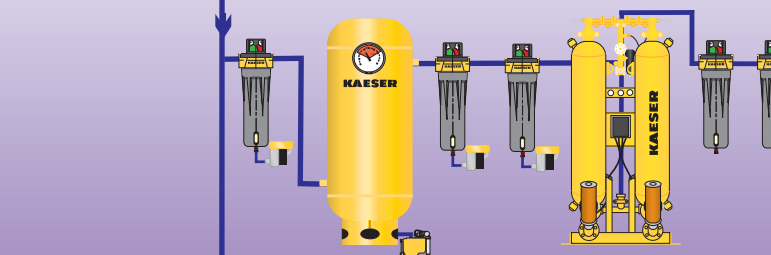


Level 4

Refrigerated Compressed Air Dryer produces pressure dew points as low as 35°F. **Oil Removal Filter** removes 99.999% of oil aerosols and all solid particles .025 microns and larger. **Oil Vapor Adsorber** removes oil vapor, oily smell and taste.

ISO 8573.1 Quality Class: 1.4.1

Applications: Food Industry, Chemical and Pharmaceutical Industry

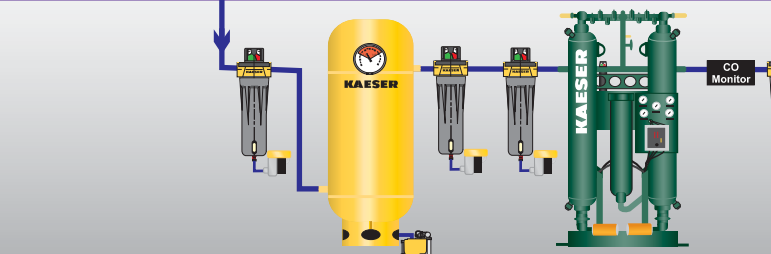


Level 5

Air Line Filter removes 70% of oil aerosols and all solid particles one micron and larger. **Oil Removal Filter** removes 99.999% of oil aerosols and all solid particles .025 microns and larger. **Low Dew Point Desiccant Dryer** produces pressure dew points as low as -100°F.

ISO 8573.1 Quality Class: 1.1.1

Applications: Breweries, Dairy Industry, Electronics Industry



Level 6

Breathing Air System (Continuous or Portable) removes common harmful compressed air contaminants and will produce Grade D breathing air.

ISO 8573.1 Quality Class: 1.2.1

Application: Breathing Air



Air-Cooled Aftercooler (KAC)

Atmospheric air entering a compressor contains water vapor. The compression process concentrates these water vapors. Once the air travels downstream, the vapor cools and condenses into liquid. If not removed, it contaminates the entire compressed air system and causes corrosion. Corrosion in turn leads to air leaks, pressure drops, and scale formation. Products and processes are ruined and lost production time results. Aftercoolers are an economical way to remove up to 70% of water vapor and cool air to safe, usable levels for many applications. Aftercoolers also prepare the air for further filtration and drying.

Aftercoolers and Separators

Air-Cooled and Water-Cooled Aftercoolers

Aftercoolers provide an economical way to remove as much as 70% of the water vapor in compressed air. Air-cooled aftercoolers are durable, free standing units that cool compressed air down to 5°F above the ambient temperature.

Kaeser water-cooled aftercoolers consist of a shell-and-tube heat exchanger in which compressed air is cooled to within 15°F of the cooling water temperature. Kaeser Rotary Screw compressors include built in aftercoolers and do not require an additional aftercooler. The KAC and KWC are recommended mainly for compressors with discharge temperatures above 110°F or any compressor that does not have a built in aftercooler.

Sizes: AC, 35 – 3500 cfm

Sizes: WC, 40 – 2800 cfm

High Pressure Aftercoolers

High Pressure Aftercoolers are available in a water-cooled version. Varying sizes and pressures are available. Stainless steel heat exchanger tubes provide durability for the demanding pressures.

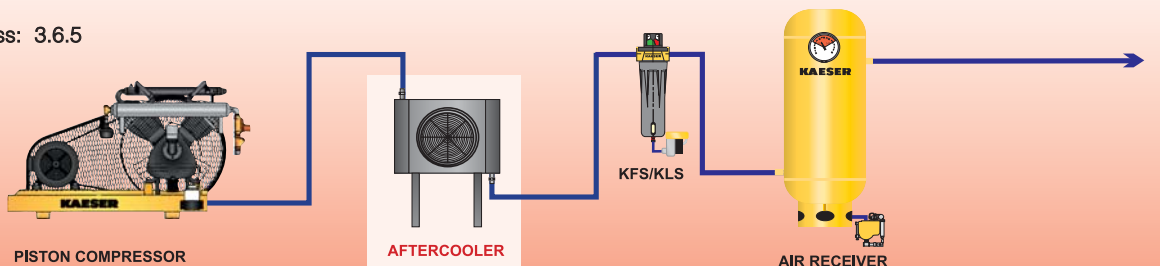
Kaeser Liquid Separators (KLS)

Kaeser Liquid Separators remove moisture from compressed air by means of a stainless steel, offset separator core. Water is forced out of the air stream and falls to the bottom for collection. They are typically placed at the discharge of aftercoolers, but can be used in any number of applications where large amounts of liquid must be removed. A KFS can be substituted in place of a KLS to provide particulate filtration as well.

Sizes: 20 - 2250 cfm

ISO 8573.1 Quality Class: 3.6.5

Level 1:
Low Grade Shop Air





Refrigerated Air Dryers

Refrigerated dryers dry air to pressure dew points of 35°F or higher, which accounts for the majority of compressed air applications. The refrigeration system cools the air thereby allowing moisture to condense. All dryers include a moisture separator and drain for removing water from the system. Kaeser offers a variety of refrigerated dryers to meet general or specific needs.



HTRD Series

Refrigerated Air Dryers

Cycling Refrigerated Dryers (Secotec)

Kaeser cycling dryers offer the most energy savings by using cold storage and the Secotec control system. Solid material is used for thermal storage so leakage problems are avoided. The tower layout is designed for easy maintenance, accessibility, and minimal floor space. A precooler/reheater provides increased cooling efficiency. Their simple design and top quality construction make them extremely reliable.

Sizes: 20 – 520 cfm

Non-cycling Refrigerated Air Dryers (T Series)

The T Series non-cycling dryer with Demand Manager Control or energy-saving Dual Control provide economical solutions for most applications. The Demand Manager Control works best with steady airflow demand while the Dual Control matches energy requirements to fluctuating airflow demand. All units use environmentally friendly R404-a refrigerant.

Sizes 10-15/600 – 3000 cfm

High Capacity Refrigerated Dryers (KHD)

KHD's are non-cycling dryers available in 2000 to 20,000 scfm and a maximum working pressure of 175 psig (higher

pressures are available). The multipass heat exchangers provide uniform cooling and stable dew point over a full range of flow conditions. The KHD's are designed for low pressure drop and include a 3-stage separator for maximum moisture removal.

Sizes: 2000 – 20,000 cfm

High Temperature Refrigerated Dryers (HTRD)

HTRD's replace a separate aftercooler, separator, dryer and filter. They are specifically designed for high inlet temperatures and are ideal for body shops, auto service centers, and commercial and industrial facilities with 5 to 20 horsepower compressors. HTRD's are lightweight and have a small footprint for convenient installation.

Sizes 20 – 75 cfm

High Pressure Refrigerated Dryers (HT)

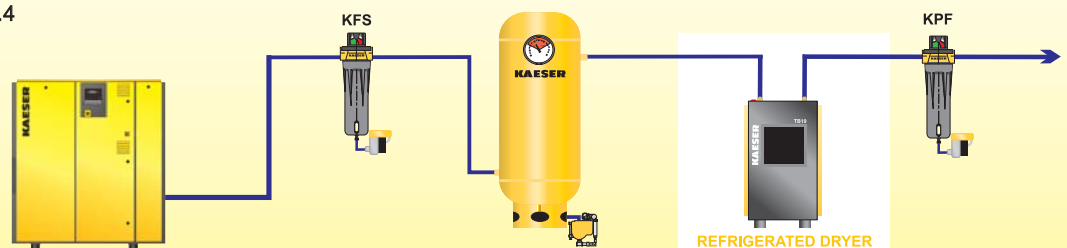
High pressure applications are also subject to the threat of contaminants and harmful moisture, but standard dryers are not designed to handle pressures over 200 psig. Kaeser offers a line of dryers to handle high pressure applications such as PET bottling systems.

Sizes: 13 – 1200 cfm

Maximum Pressure: 900 psig

ISO 8573.1 Quality Class: 2.4.4

**Level 2:
General Shop Air
Air Tools
Sand Blasting**





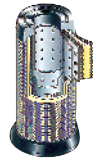
Filters

Filters provide the additional protection from contaminants that degrade process equipment and decrease air tool performance. Filters remove the solid particles, oil aerosols, moisture and oil vapors that get past the dryers. Adding filters to the compressed air system will save considerable costs in process downtime, for cleaning tools, and repairing equipment. The right filter combination plays a key role in preventing unwanted dirt and oil from reaching end products like food and beverages. The filters include bayonetted or screw on housings for easy element replacement. Other features include easy to read differential pressure gauges to signal element contamination, modular mounting, liquid level indicators, and internal drains. The latest filter media technology results in higher efficiencies and lower pressure drop. The elements are also color-coded for easy identification.

Sizes: 20 – 21,250 cfm

Filters

Kaeser Filtered and Liquid Separators (KFS/KLS)



Kaeser Filtered and Liquid Separators (KFS/KLS) are extremely effective for water removal and also provide protection from contaminants.

They should be used for bulk liquid removal and placed before air dryers and after aftercoolers. These filters provide sufficient filtration for low grade shop air.

Kaeser Particulate Filter (KPF)



Kaeser Particulate Filters (KPF) are primarily designed to remove solid particles but remove water and oil aerosols as well. They should be

placed downstream of refrigerated dryers or downstream of heatless desiccant dryers to remove desiccant fines. They are commonly placed after a KFS and before a coalescing filter. (Also offered in Reverse Flow KPF-RF)

Kaeser Oil Removal Filter (KOR)



Kaeser Oil Removal (KOR) filters remove a large amount of the oil aerosols and remaining liquids as well as small particles. These

coalescing filters should be placed downstream of refrigerated dryers to prevent oil carry-over and upstream of desiccant dryers to prevent oil from contaminating the desiccant. A KFS or KPF should always be placed upstream of the KOR to prevent it from overloading with liquid.

Kaeser Oil Removal Extra Fine Filters (KOX)



Kaeser Oil removal eXtra fine filters (KOX) offer even greater protection than the KOR series. They are also coalescing filters and should

be used in extra sensitive applications where oil is not tolerated. It is important for the KOX to have the proper upstream protection, a KFS or KPF, to prevent overloading with liquid.

Kaeser Vapor Filters (KVF)

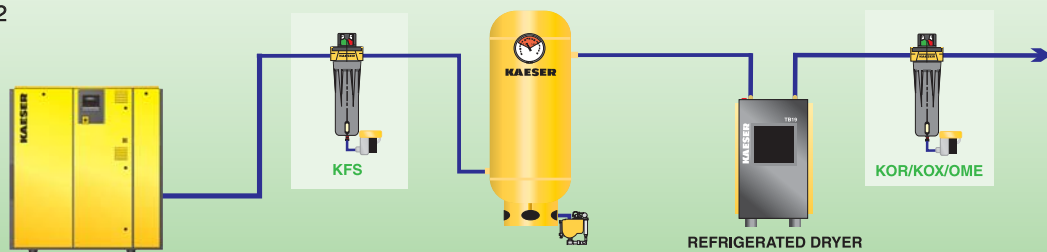


Kaeser Vapor Filter (KVF) remove oil vapors and odor from compressed air. Several layers of activated carbon provide effective removal of

these vapors. These filters should be placed downstream of KOR/KOX filters since they do not tolerate any liquid. The food and chemical industries benefit from these filters in maintaining product quality.

ISO 8573.1 Quality Class: 1.4.2

Level 3:
Instrument Air
Paint Spraying
Powder Coating
Packing Machines





Oil Mist Eliminator



Kaeser Activated Carbon Tower



Single Tower Desiccant Dryer, High Temperature Afterfilter, and High Pressure Filter

Filter Monitor (KFM)



The Kaeser Filter Monitor is a microprocessor control with LCD display. It indicates optimum element replacement based on operating time, differential pressure, and filter type. The filter monitor is capable of sending alarm signals to remote computer terminals.

Oil Mist Eliminators (OME)

Oil Mist Eliminators (OME) are basically large oil removal filters with a very low pressure drop. Not only do they remove both oil aerosols and water, but they can handle large slugs of liquid. The cartridge life is normally 8 to 15 years thus requiring virtually no maintenance.

Sizes: 125 – 3000 cfm

Kaeser Activated Carbon Towers (KAT)

Kaeser Activated Carbon Towers (KAT) remove oil vapor and odor associated with compressed air. They are used where oil vapor and odor contaminate end products such as food, drugs, and chemicals. The carbon beds are designed for a long life of up to 30,000 hours.

Sizes: 60 – 5500 cfm

Single Tower Desiccant Dryer (KDF)

Kaeser single tower desiccant air dryers that provide dew points as low as -40°F and are ideal for small volume air applications. They are excellent for point of use drying where low dew points are required. No electrical power is required and regeneration is achieved by offline purging or desiccant replacement.

High Temperature Afterfilters (HTA)

High Temperature Afterfilters (HTA) are particulate filters designed for temperatures up to 450°F. They are commonly placed after heated desiccant dryers to take out the desiccant fines and handle the high temperatures induced by the heaters.

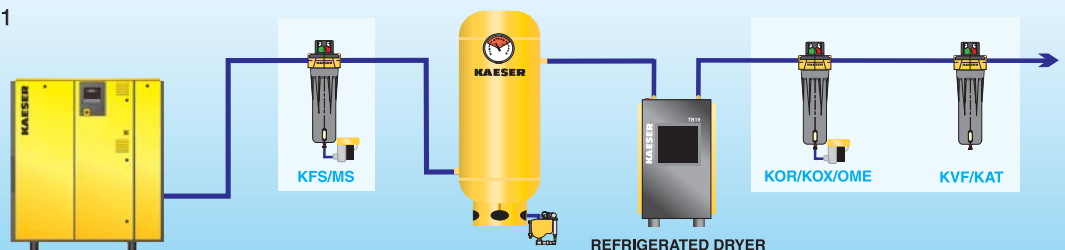
Sizes: 100 – 11,400 cfm

High Pressure Filters (HP)

High Pressure filters (HP) are available for applications requiring pressures up to 900 psig. They include seam welded stainless steel cores for greater durability and corrosion resistance. The HP filters are well suited for PET bottling systems and should be installed down-line from high pressure compressors or boosters and dryers. They are also available in five different grades, as in the standard line; see previous page.

ISO 8573.1 Quality Class: 1.4.1

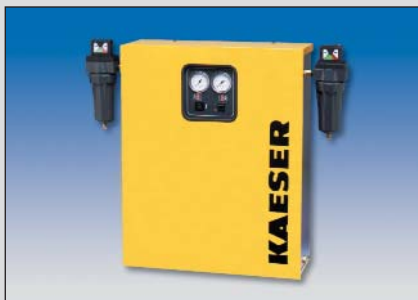
Level 4:
Food Industry
Pharmaceutical &
Chemical Industries
Laboratories





KAD Series

Desiccant dryers provide extremely dry air for applications requiring complete water and water vapor removal. Dew points achieved are as low as -150°F. The desiccant material adsorbs moisture in the air until it reaches its maximum capacity at which point it must be regenerated or replaced. The method of regeneration is what differentiates the types of desiccant dryers (KAD, KED, and KBD).



KADW Series

Desiccant Air Dryers

Kaeser Adsorption Desiccant Dryers (KAD)

Kaeser Adsorption Desiccant dryers (KAD) are heatless reactivating dryers that rely on purge air for regeneration. Approximately 15% of the dry exhaust air is used to regenerate the saturated tower. KAD's are initially less expensive than heat reactivated dryers.

Sizes: 40 – 5400 cfm

Kaeser Adsorption Desiccant Wall Mounted Dryers (KADW)

Kaeser Adsorption Desiccant Wall mounted dryers are available in 5 to 25 scfm sizes. The optional mounted filters provide easy installation. These heatless regenerative dryers are well suited for outdoor applications such as railroad supply air.

Sizes: 5 – 25 cfm

Kaeser Heated Exhaust Purge Dryers (KED)

Kaeser Exhaust purge Dryers (KED) are heated regenerative dryers that use only 7% of exhaust air for purging. They heat the 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.

Sizes: 250 – 3200 cfm

Kaeser Heated Blower Purge Dryers (KBD)

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 excellent energy savings by eliminating the need to use costly compressed air for purging.

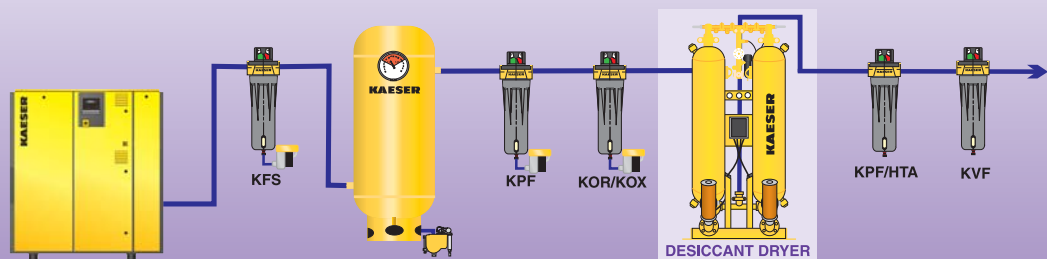
Sizes: 250 – 3200 cfm

Proper Filtration

All desiccant dryers require at least an oil removal prefilter, KOR, to prevent oil from contaminating the desiccant and a particulate afterfilter, KPF, to remove desiccant dust. The KED's and KBD's, however, require a high temperature afterfilter, HTA, due to the high discharge temperatures.

ISO 8573.1 Quality Class: 1.1.1

Level 5:
 Outdoor Pipelines
 Breweries
 Dairy Industry
 Electronics Industry
 Pharmaceutical &
 Chemical Industries
 Laboratories





Automatic Magnetic Drain Trap (AMD)

Once the moisture is collected it has to be discharged from the system. If it is not, the water will accumulate and move down line into the piping system contaminating your equipment or process. Kaeser offers a variety of drain traps to remove moisture automatically. Drain traps remove moisture from separators, receiver tanks, intercoolers, aftercoolers, dryers, filters, and drip legs.



Eco-Drains

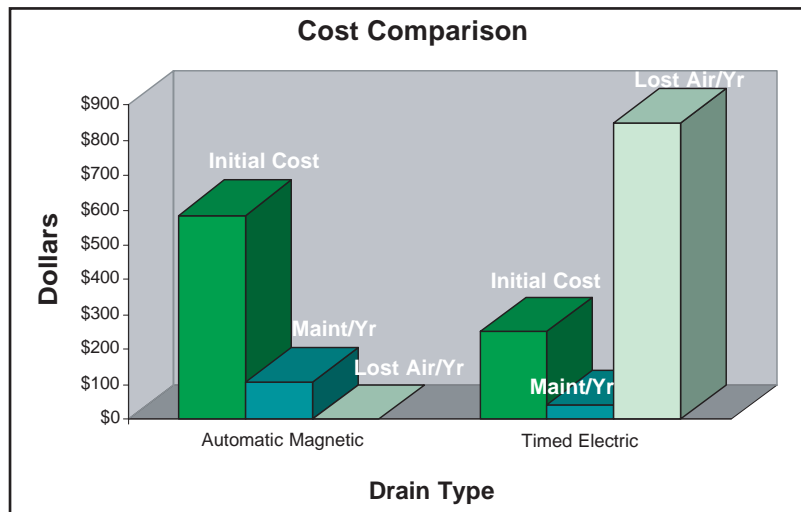
Condensate Drain Traps

Automatic Magnetic Drain Trap (AMD)

The AMD is a heavy duty unit designed for large liquid loads and severe conditions. It has large orifices, which prevent clogging and eliminate the need for a strainer. The use of magnets to actuate the valve makes it possible to have the working parts isolated from the condensate and contaminants.

Eco-Drain

The Eco-Drain Series drain traps provide excellent performance when applied in locations such as dryers and filters. The patented 3/2 way valve design ensures that the control air is contaminant free. The Eco-Drain's sensor allows the drain to open only when necessary therefore no valuable compressed air is lost.



Breathing Air Systems

Kaeser Breathing Air Systems (KBS) provide safe air for applications where workers have to be protected from harmful gases and fumes. These systems include filters to remove contaminants and oil, a desiccant air dryer to remove moisture, and catalytic materials to con-

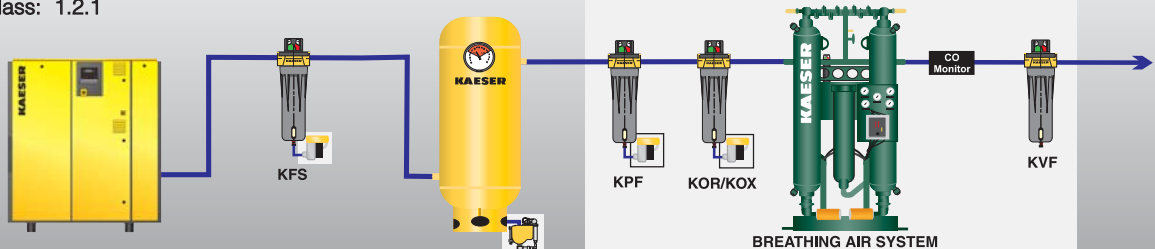
vert carbon monoxide to carbon dioxide. The KBS meet OSHA's standard for breathing air quality.

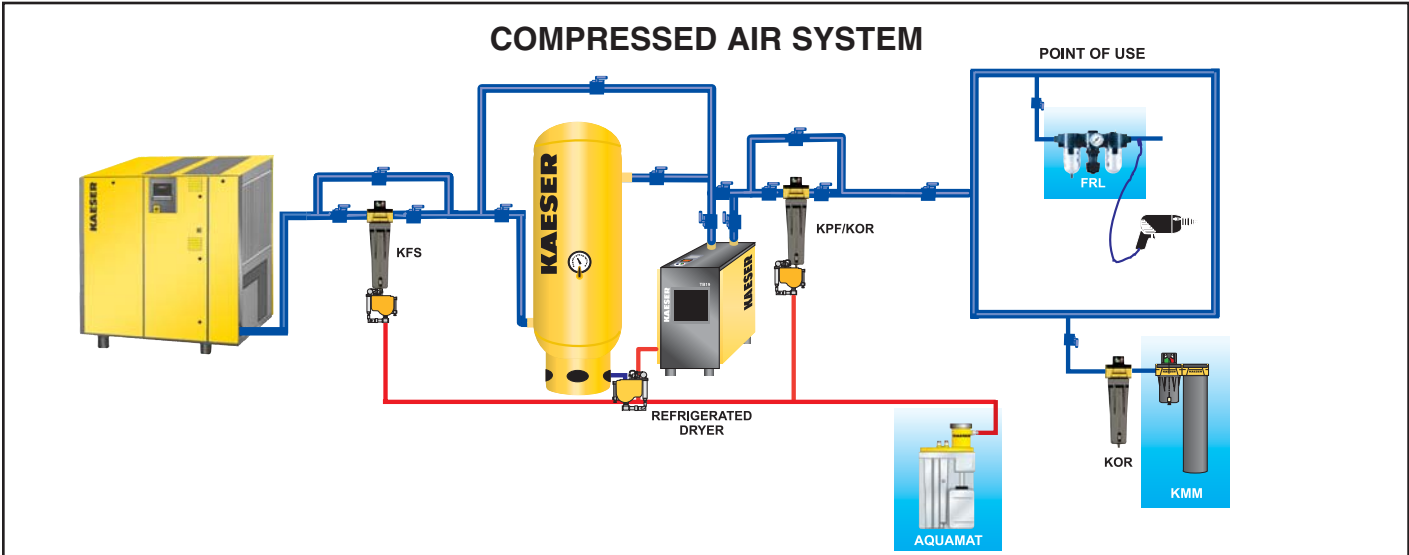
Sizes: 12 – 800 cfm



ISO 8573.1 Quality Class: 1.2.1

Level 6:
Breathing Air
Meets OSHA
grade D)





Kaeser Membrane Dryers (KMM)

Kaeser Membrane Dryers (KMM) provide a dew point suppression without requiring any external power or regular maintenance. These dryers are well suited for point of use applications and are easy to install requiring simple piping connections. They are lightweight and

available with mounting brackets and prefilters for easy installation. Proper filtration includes a particulate/oil removal filter combination to prevent oil from contaminating the membrane, which seriously degrades performance.



KMM Series

Environmental Protection

Compressed air condensate is a by-product of all compressors. It is a mixture of oil and water with ambient particulates and hydrocarbons that have been concentrated during the compression process. Disposing of compressed air condensate is a major environmental concern. This oil/water

mixture is classified as hazardous waste and cannot be discharged into municipal wastewater systems unless the oil and contaminants are removed. Kaeser's Aquamat and KCF condensate management systems offer a reliable and economical method of oil/water separation.



KAESER COMPRESSORS

Built for a lifetime.™

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The Air Systems Specialist

With over 80 years of experience, Kaeser is the air systems specialist. Our extensive 100,000 square foot facility allows us to provide unequalled product availability. With service centers nationwide and our 24-hour emergency parts guarantee, Kaeser customers can rely on the best after-sales support in the industry. Kaeser stands committed to providing the highest quality air system for your specific compressed air needs.

