KAESER COMPRESSORS

Refrigeration Dryers

TG – TI Series

Air flow
24.2 to 90 m³/min

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Why is it necessary to dry compressed air?

The atmospheric air drawn into a compressor is a mixture of gases that always contains water vapour.

However, the amount of water vapour air can carry varies and is mostly dependent on temperature. As air temperature rises – which occurs during compression – the air's ability to hold moisture increases also. When the air is cooled, its capacity to hold moisture reduces which causes the water vapour to condense.

Removing the moisture from the compressed air not only prevents costly breakdowns and production downtime, but also keeps maintenance and repair costs to a minimum.

Energy-saving dryer system

Refrigeration drying is usually the most efficient solution for the majority of compressed air applications. Air-drying is now made even more cost-effective with KAESER's advanced energy-saving system.

Save energy and money with a high-efficiency dryer

The innovative energy-saving system

In developing the energy-saving system, KAESER's goal was to produce a system that consumed minimal energy and which would provide optimal reliability and user-friendliness.

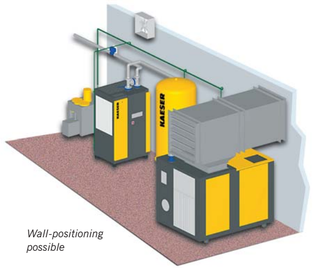
KAESER's energy-saving system fulfils all of these requirements and, in contrast to comparable refrigeration drying systems, uses a highly efficient refrigerant compressor.

The optional pre-fitted micro-filter reduces installation costs.

No installation costs for a pre-filter

Option: With FE micro-filter (red element)

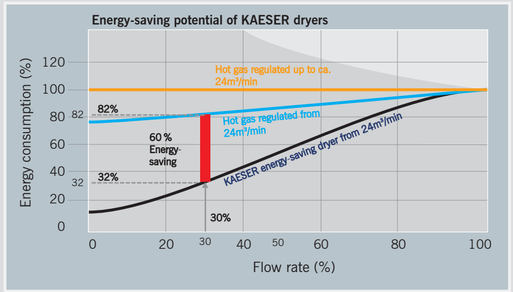
No installation costs for a micro-filter



Wall-positioning possible

Savings day after day

The energy saving system in KAESER's new refrigeration dryers **saves** you **money** day in, day out. For instance, with flow rate at 30% of maximum, electrical energy consumption is only 32% of maximum. This represents **energy cost savings of approximately 60%** when compared with a conventional dryer under hot gas bypass control.
The timer, fitted as standard, further contributes to energy savings. KAESER energy-saving dryers significantly reduce energy costs during work breaks, weekends, low demand periods and downtimes.



Moreover, every kilowatt saved means a **reduction** in CO_2 emissions, which in turn benefits the environment.

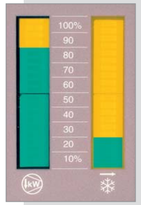
Additional savings can be achieved if the dryer operates at only 50 to 70% of full load capacity and is part of an air supply system that also has treatment components operating below full capacity. These savings can amount to **several thousand Euros per year**.

Energy saving with KAESER – For example, **TH 451** at 30 % flow rate:
Annual energy saving: € 2067 = 5.9 kW x (0.82 – 0.32) x 8760 h/year x **€** 0.08/kWh
CO_2 reductions: 15.5 t CO_2/year, 155 t CO_2/10 years (1000 kWh electricity = 0.6 t CO_2 emissions)

Super-efficient refrigerant compressor

The newly developed refrigerant compressor is able to regulate the volume of refrigerant that circulates within the refrigeration circuit in such a way that it also **reduces the compressor's power consumption**. This is achieved via a solenoid valve which varies the volume of the compression chamber depending on compressed air cooling demand.

Energy management monitor



The energy management monitor displays the actual power savings compared with a hot gas bypass controlled dryer. It also gives a continuous readout of the pressure dew point. The two-column display and LED status indicator make operation even easier. Information can be displayed in any one of five selectable languages and a test key is provided to check that the electronic condensate drain is operating correctly.

Integrated FE micro-filter (optional)

KAESER energy-saving dryers can be equipped with an optional FE model micro-filter that considerably reduces installation costs. Compressed air passes through the filter at +3 °C and oil vapours condense to aerosols that can be reliably separated out. The separation and filtration processes can be electronically monitored via an optional 'Monitorbox' device.

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More air, more savings...

- A suitable refrigeration dryer must be selected to meet the specific needs of the particular operating environment:
- The maximum possible flow rate through the refrigeration dryer rises with increasing working pressure.

  In contrast, higher compressed air inlet temperatures reduce the maximum possible flow rate.
- The maximum possible flow rate also decreases with higher ambient temperatures.

Specifications

Model	Flow rate at 7 bar working pressure ► m³/min	Max. working pressure bar	Effective power consumption kW	Compressed air connection	Condensate drain	Dimensions H x W x D	Weight kg
TG 241	24.2	16	2.8	DN 80	R 3/4	2162 x 1270 x 1032	775
TG 301	30.8	16	3.1	DN 80	R 3/4	2162 x 1270 x 1032	790
TH 371	37.5	16	4.3	DN 100	R 3/4	2162 x 1270 x 1287	845
TH 451	45	16	5.9	DN 100	R 3/4	2162 x 1270 x 1287	890
TI 521	52.5	16	6.7	DN 150	R 3/4	2162 x 1438 x 1510	1010
TI 601	60	16	7.5	DN 150	R 3/4	2162 x 1438 x 1510	1050
TI 751	75	16	9.4	DN 150	R 3/4	2162 x 1438 x 1510	1090
TI 901	90	16	11.5	DN 150	R 3/4	2162 x 1438 x 1510	1200

Power supply 400 V-50 Hz-3 ph – Refrigerant R 404a

► Performance data for reference conditions to ISO 7183, option A: Ambient temperature +25 °C, air inlet temperature +35 °C, pressure dew point +3 °C. The flow rate changes for other operating conditions.

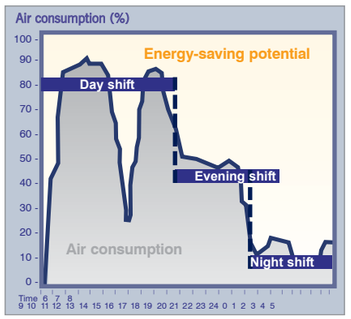
Correction factors for flow rates

Ambient temperature	*+ 25 °C*	*+ 30 °C*	*+ 35 °C*	*+ 40 °C*	*+ 45 °C*	
Correction factor	1.0	0.94	0.89	0.83	0.78	

	Air inlet temperature	*+ 25 °C*	*+ 30 °C*	*+ 35 °C*	*+ 40 °C*	*+ 45 °C*	*+ 50 °C*
Pressure	3 bar	1.42	1.00	0.79	0.63	0.51	0.43
	5 bar	1.57	1.08	0.87	0.77	0.65	0.56
	7 bar	1.67	1.22	1.00	0.84	0.71	0.63
	9 bar	1.76	1.29	1.07	0.91	0.78	0.67
	11 bar	1.84	1.36	1.13	0.96	0.82	0.73
	13 bar	1.90	1.41	1.18	1.00	0.86	0.77

Correction factor

High-efficiency dryers – Eight decisive advantages

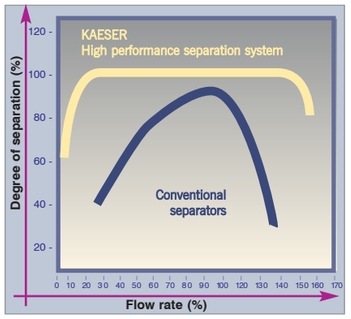


1 Daily savings

KAESER energy saving dryers consume electrical power only when actually drying air. Electrical **power consumption** at partial load is **reduced directly in proportion** to the air flow rate. For example, at 30% maximum air flow rate, electrical power consumption is only 32% of rated maximum. Further energy is saved in autumn, winter and spring when air inlet temperatures are lower. The energy-saving control uses a combination of compressed air temperature measurement, programmable logic control and adjustable compression chamber refrigerant compressors. A solenoid valve regulates the size of the compression chamber so that less power is consumed under partial load. The result: significant savings day in, day out, year after year.

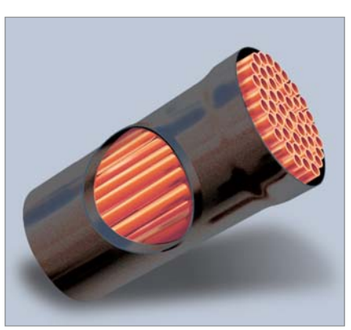
2 Minimal pressure drop for maximum savings

The generously sized separator system and flow-optimised heat exchanger keep the pressure drop across the dryer to an absolute minimum – **appreciably lower** in fact than that of other dryer system designs. As every 0.5 bar increase in pressure means a 3 % increase in compressor energy requirement, it therefore makes sense to reduce pressure drops to a minimum in order to save energy costs. KAESER energy-saving dryers also feature a contamination-resistant heat exchanger, which means that, unlike other dryers, they **do not require a separate pre-filter**. This achieves further energy savings and avoids additional investment costs.



3 High performance separation system

Together with solid particles larger than three microns, the condensate that forms during compressed air cooling is separated **efficiently and reliably** through coalescence. Furthermore, the system's design ensures reliable condensate separation even under partial load conditions. A consistent degree of separation and a steady pressure dew point of +3 °C are ensured from 10 to 150 percent of nominal flow rate, even with widely fluctuating demand. This is particularly important for redundancy of dryers in large air supply systems.



4 Premium quality heat exchanger

The air/air and refrigerant/air heat exchanger pipes are made from premium quality copper and their high thermal conductivity ensures a constant pressure dew point (+3 °C) throughout the refrigeration dryer system. The use of smooth bore, **flow-optimised** copper piping not only ensures that the pressure drop remains exceptionally low, but also **prevents corrosion and contamination build-up** from occurring. No additional pre-filter is therefore necessary, which means that costly pressure drops caused by additional filters are avoided. KAESER energy-saving dryers provide years of reliable service coupled with **long-term value retention**.

5 Dependable, intelligent condensate drainage

The ECO-DRAIN is fitted with an intelligent level-sensing control that prevents loss of pressure though the condensate drain line. When the collector tank is full, the level sensor opens a diaphragm valve and the condensate is drained off. The electronic control system keeps the valve open until the container is empty and closes it again before any compressed air can escape.

6 Industrial quality control cabinet for absolute safety

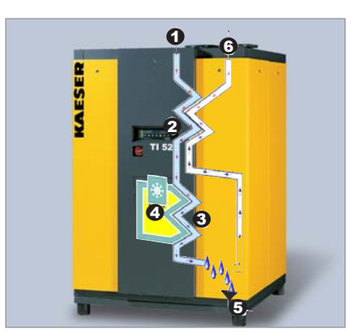
Every KAESER refrigeration dryer is EN 60204-1 compliant and is tested for electromagnetic compatibility in accordance with applicable EMC standards. Unlike equipment conforming to VDE 07010, KAESER refrigeration dryers conform to a strict industrial standard and are therefore equipped with a high-protection control cabinet and fuses for the control & power circuits. In addition, a control transformer ensures that the control circuits are DC-isolated from the mains. The whole system is designed with maximum safety and reliability in mind.

7 Optional filter monitoring

KAESER energy-saving dryers can be equipped with an FE model micro-filter. This provides **electronic monitoring** of the FE micro-filter and the high-performance separator system. Microprocessor-controlled filter monitors and 'Monitorboxes' are installed to generate and forward signals. This option also provides remote filter monitoring capability. The "Group" and "Safety" **alarm contacts** provide additional security for specialised air treatment requirements.

8 Unrivalled reliability

Operation of the refrigeration dryer can be divided into four stages: **Stage 1**: The hot compressed air entering the dryer (1) is initially cooled in the upper part of the heat exchanger (2) by the cold compressed air leaving the dryer. **Stage 2**: The air is cooled further to the dew point temperature in the lower part of the heat exchanger (3) by the refrigerant circuit (4). **Stage 3**: Condensate formed as a result of the cooling process is removed from the air by the highly effective separation system (5). The condensate is removed from the separator by the automatic ECO DRAIN. **Stage 4**: The dried air is reheated in the upper part of the heat exchanger (2) before leaving the dryer outlet (6).



Equipment

General design

Tower construction with removable side panels, all panels powder coated, all materials are CFC-free. All cold components are insulated, the built-in control cabinet is enclosure-protected to IP54. The dryer is equipped with: air-to-air and air-to-refrigerant heat exchangers, condensate separating system, air connections located near the top of the unit and an electronic condensate drain. Scope of delivery includes refrigerant and oil charge.

Control panel

Display of energy savings, current flow rate and pressure dew point, two-line plain text display, three LED status indicators, five selectable languages, ON/OFF key, test key for the electronic condensate drain, three timer programming keys, reset key and main switch.

Refrigerant circuit

Automatic dew-point regulation, hermetically-sealed refrigerant circuit, scroll refrigerant compressor with variable compression chamber volume.

Optional accessories

- Integrated FE micro-filter downstream of the separator, located at the coldest point
- Integrated FE micro-filter with electronic filter monitoring (sensors and Monitorbox)
- Version with water-cooled refrigerant condenser
- Additional language modules available for control panel

Comprehensive design know-how

KESS (KAESER's Energy Saving Service) provides comprehensive analysis of your compressed air usage, enabling KAESER's experts to plan and design a system that is specially tailored to meet all of your compressed air requirements. This service combines tried and tested compressed air components, user advice and services with cutting-edge technology to ensure maximum efficiency - KAESER air systems typically operate at 95 percent load capacity or more. Every KAESER compressed air system illustrates KAESER's commitment to producing application-specific quality compressed air at the lowest possible cost, combined with unsurpassed reliability. Use this expertise to your advantage and let KAESER design your compressed air system.

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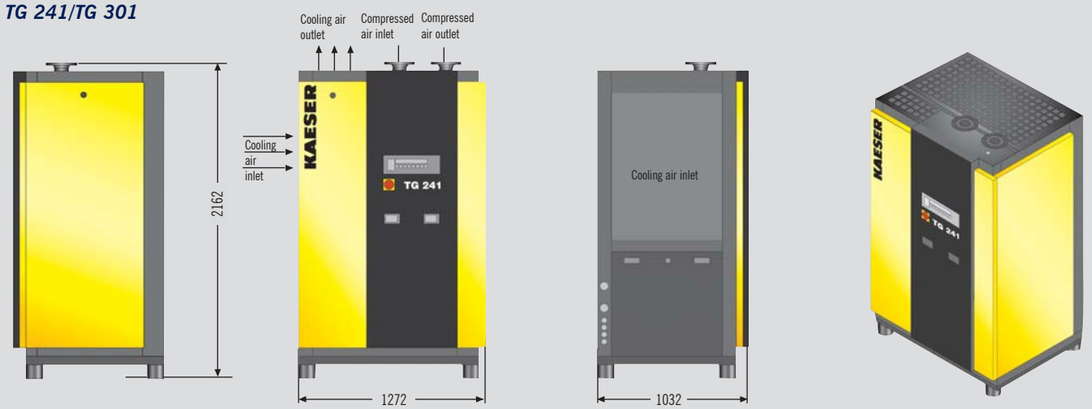
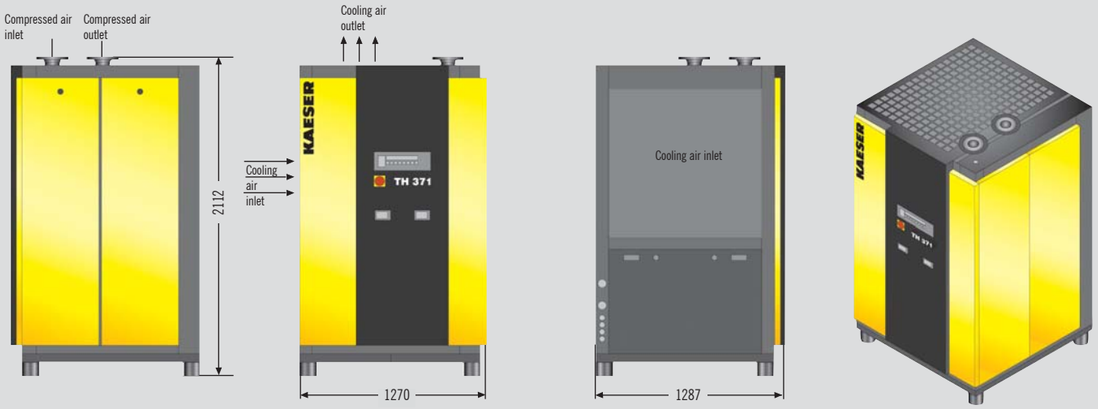
Dimensions:

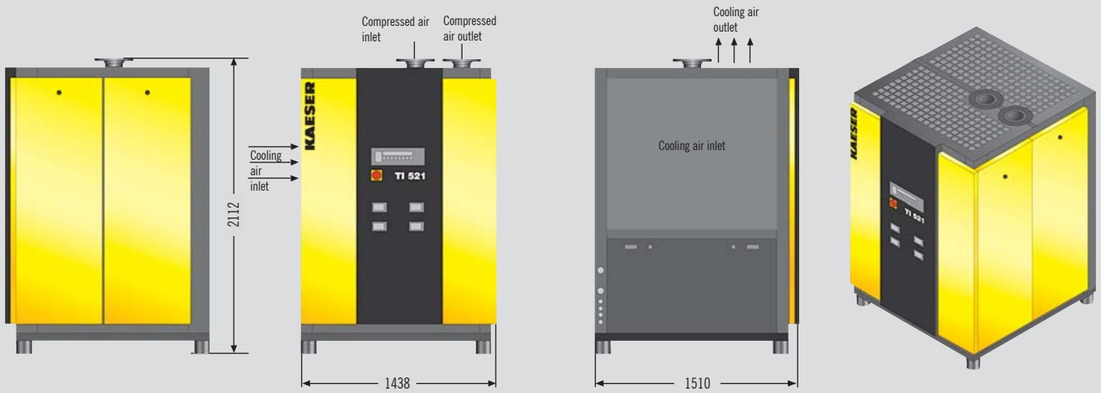
TG 241/TG 301



TH 371/TH 451



TI 521 to TI 901



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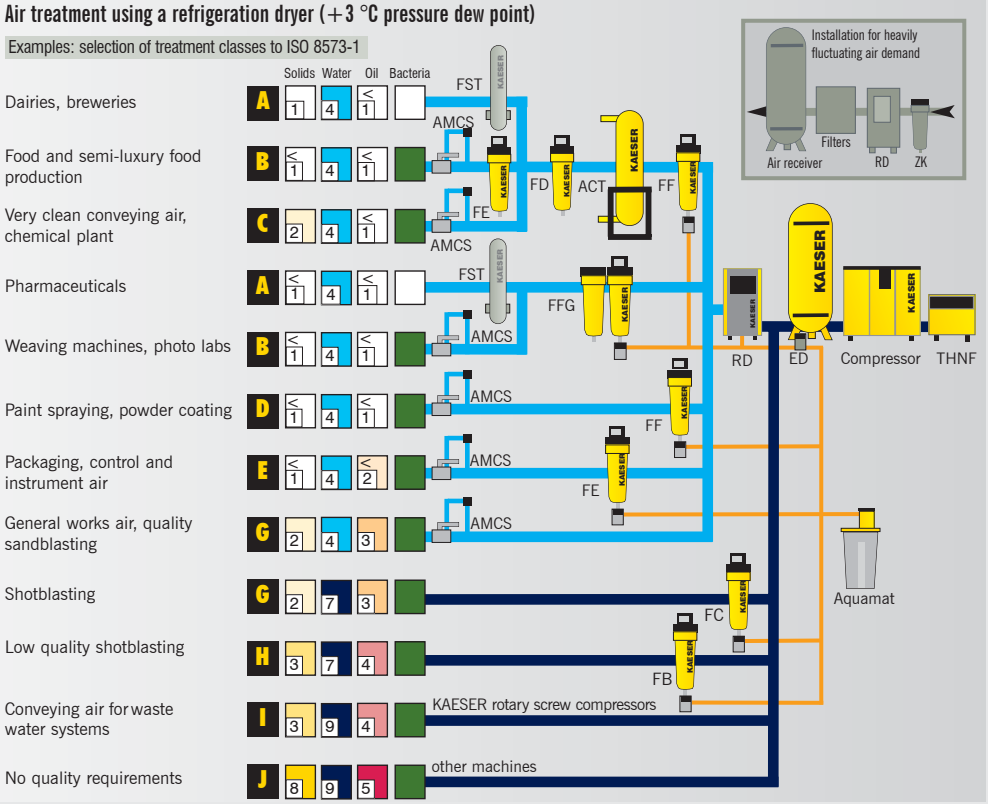
Different fields of application need different grades of air treatment

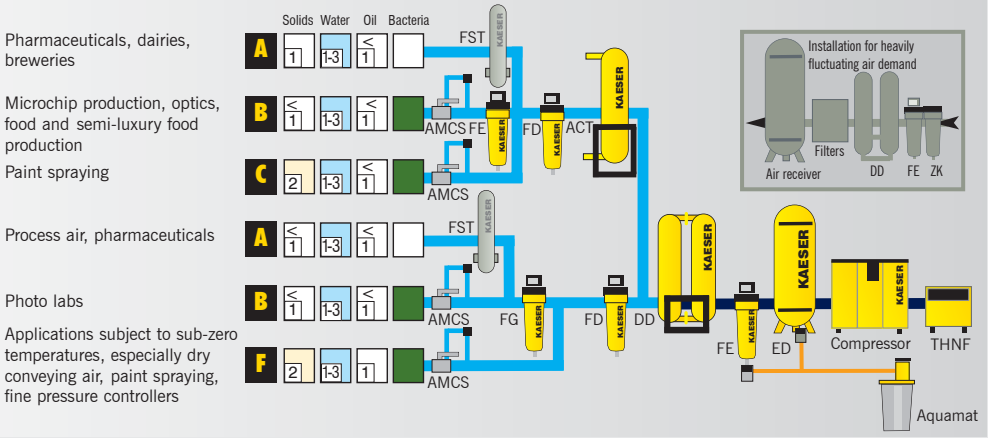
Choose the required grade of treatment according to your field of application:

Air treatment using a refrigeration dryer (+3 °C pressure dew point)

Examples: selection of treatment classes to ISO 8573-1



For air mains subject to sub-zero temperatures: treatment systems with desiccant dryers (pressure dew point to -70 °C)



A Oil vapour content ≤ 0.003 mg/m³, particle retention > 0.01 µm sterile, odourless and taste-free

B Oil vapour content ≤ 0.003 mg/m³, particle retention > 0.01 µm

C Oil vapour content ≤ 0.003 mg/m³, particle retention > 1 µm

D Aerosol oil≤ 0.001 mg/m³, particle retention > 0.01 µm

E Aerosol oil≤ 0.01 mg/m³, particle retention > 0.01 µm

F Aerosol oil≤ 0.01 mg/m³, particle retention > 1 µm

G Aerosol oil ≤ 1 mg/m³, particle retention > 1 µm

H Aerosol oil≤ 5 mg/m³, particle retention > 3 µm

I Aerosol oil ≤ 5 mg/m³, particle retention > 1 µm

J Untreated

Explanation:

THNF = bag filter
cleans dusty and highly contaminated intake air

ZK = centrifugal separator
removes condensate

ED = ECO Drain
electronic level-controlled condensate drain

FB = prefilter 3 µm
separates liquid droplets and solid particles >3 µm, oil content ≤5 mg/m³

FC = prefilter 1 µm
separates oil droplets and solid particles >1 µm, oil content ≤1 mg/m³

FD = particulate filter 1 µm
separates dust particles (attrition) >1 µm

FE = microfilter 0.01 ppm
separates aerosol oils and solid particles >0.01 µm, aerosol content ≤0.01 mg/m³

FF = microfilter 0.001 ppm
separates aerosol oils and solid particles >0.01 µm, oil content ≤0.001 mg/m³

FG = activated carbon filter
for adsorption of oil vapours, oil vapour content ≤0.003 mg/m³

FFG = combination filter
comprising FF and FG

RD = refrigeration dryer
pressure dew point to +3 °C

DD = desiccant dryer
for compressed air drying; DC series - heatless regeneration, pressure dew point to -70 °C; DW, DN, DTL and DTW series - heat regeneration, pressure dew point to -40 °C

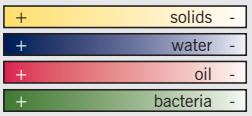
ACT = activated carbon adsorber
for adsorption of oil vapours, oil vapour content ≤0.003 mg/m³

FST = sterile filter
for bacteria-free air

Aquamat = condensate treatment system

AMCS = air-main charging system

Contaminants:



Degree of filtration:

ISO 8573-1 Class	Solid particles: Max. no. of particles per m³ with size d (µm) 0.1 < d ≤ 0.5	0.5 < d ≤ 1.0	1.0 < d ≤ 5.0	Solid particles: Mass concentration µm	mg/m³	Humidity: Pressure dew point (x = liquid water in mg/m³)	Oil concentration mg/m³
0	as specified by user						
1	100	1	0	–	–	≤ -70 °C	≤ 0.01
2	100000	1000	10	–	–	≤ -40 °C	≤ 0.1
3	–	10000	500	–	–	≤ -20 °C	≤ 1.0
4	–	–	1000	–	–	≤ +3 °C	≤ 5.0
5	–	–	20000	–	–	≤ +7 °C	–
6		–		≤ 5	≤ 5	≤ +10 °C	–
7		–		≤ 40	≤ 10	x ≤ 0.5	–
8		–		–	–	0.5 < x ≤ 5.0	–
9		–		–	–	5.0 < x ≤ 10.0	–

LGA InterCert Certified QM-System ISO 9001:2000
LGA InterCert Certified EM-System ISO 14001

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