HPC Compressed Air Systems

KAESER COMPRESSORS®

Energy-Saving Refrigeration Dryers

SECOTEC® TA to TD series

The savings specialists with stable pressure dew point

Flow rate 0.60 to 8.25 m³/min, pressure 3 to 16 bar

www.hpccompressors.co.uk

SECOTEC TA to TD series

The savings specialists with stable pressure dew point

The SECOTEC name has long been synonymous with high-quality KAESER refrigeration dryers built for industrial duty, stable dew points, maximum reliability and minimal overall life-cycle costs. SECOTEC refrigeration dryers in the TA to TD series dry compressed air to a pressure dew point of 3 °C thanks to highly efficient thermal mass control tailored to individual needs, for outstanding savings.

A generously dimensioned thermal mass ensures low-wear operation and a stable pressure dew point. Made in Germany: All SECOTEC refrigeration dryers are built in accordance with the very highest quality standards at KAESER's plant in Gera.

Energy savings

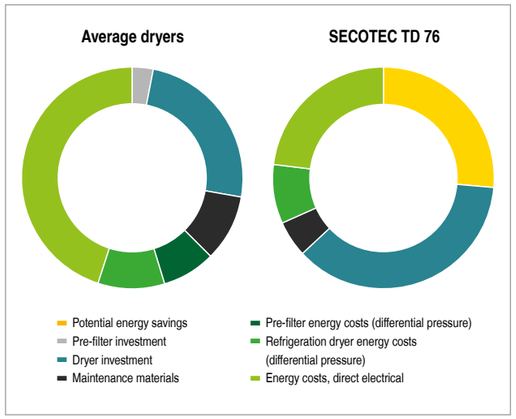
SECOTEC-series refrigeration dryers feature very low energy consumption. With energy-saving control, the thermal mass can store excess cooling capacity until it's needed, enabling later drying without power consumption – which is highly beneficial during partial-load operation. The quick-response heat exchanger system ensures stable pressure dew points at all times, which in turn delivers huge potential energy savings in partial-load operation and during downtime.

Easy to maintain

SECOTEC refrigeration dryers are extremely low-maintenance. Yet on rare occasions when service is needed, their enclosure design enables easy access to all service-relevant components, including the condenser, which is very easy to clean. All of these advantages effectively reduce servicing/testing requirement and therefore costs.

Long-term efficiency

SECOTEC-series refrigeration dryers are a highly attractive choice with their highly durable, low-maintenance design. Their high-quality refrigerant circuit enables reliable performance in ambient temperatures up to +43 °C – with low material-load thanks to the high-performance thermal mass. The generously-dimensioned stainless steel condenser and ECO-DRAIN condensate drain (TA 8 and up) provide reliable condensate removal in all load phases, enabling a stable pressure dew point. The electrical equipment corresponds to Standard EN 60204-1.



Reduce life-cycle costs

Three factors make possible the extremely low life-cycle costs of the new SECOTEC refrigeration dryers: the low-maintenance design, energy-efficient component selection and primarily, as-needed SECOTEC thermal mass control.

Thanks to these three factors, a SECOTEC TD 76 can save up to 26% of total life-cycle costs compared to other typically available refrigeration dryers.

Case study: SECOTEC TD 76 compared to a typical dryer with hot gas bypass control:

Flow rate 8.25 m³/min, 40 % duty cycle, 6.55 kW/(m³/min), additional energy requirement 6 %/bar, € 0.20/kWh, 6,000 operating hours per year, annual debt service over 10 years.

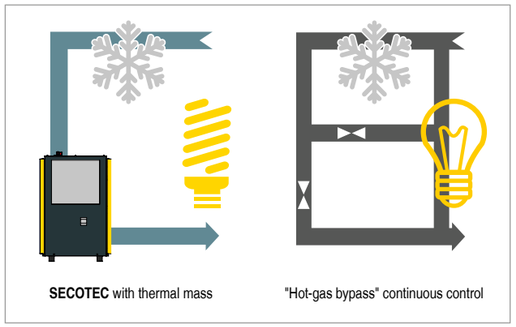
Perfect for every compressed air need

Image: SECOTEC TA 11, TD 76

SECOTEC TA to TD series

The energy-efficient powerhouse

Consistent use of high-quality components and our decades of experience in system design allow SECOTEC refrigeration dryers to achieve exceptional energy efficiency – across the entire load range.

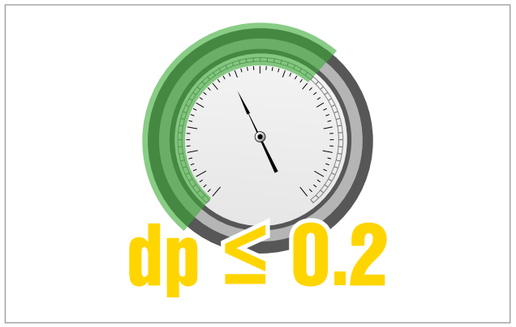


SECOTEC CONTROL

The SECOTEC thermal mass control significantly reduces energy consumption compared with conventional systems with continuous control. The refrigeration circuit is activated only when cooling is actually required.

Efficient SECOTEC solid thermal mass

At the heart of every SECOTEC refrigeration dryer is a thermal mass with exceptionally high capacity. Moreover in the TA to TD series, the entire air-refrigerant heat exchanger is embedded in a storage medium and encased by efficient heat protection.



Minimal differential pressure

SECOTEC-series refrigeration dryers feature very low differential pressure. This is made possible thanks to the generously dimensioned flow cross-sections within the heat exchanger and compressed air lines.

No pre-filter

SECOTEC energy-saving dryers do not require a pre-filter (with piping unaffected by corrosion). This translates into significantly lower investment and maintenance costs, as well as a lower pressure drop.

SECOTEC TA to TD series

Long-term efficiency

We don’t just talk about challenging operating conditions, but actually create them in our advanced climate testing facilities. This allows us to fine-tune SECOTEC refrigeration dryer design in order to ensure maximum reliability at all times.

Reliable separation

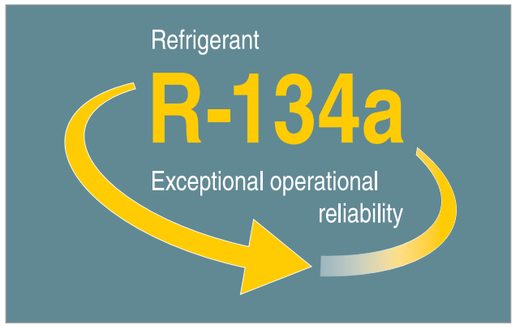
KAESER’s corrosion-free stainless steel condensate separators provide dependable compressed air drying and ensure reliable condensate separation even at partial load.

Powerful refrigerant condenser

Generously-dimensioned heat exchanger surfaces contribute to the significantly higher performance reserves of SECOTEC refrigeration dryers. Compared to other dryers on the market, this allows them to deal with load peaks (-> contamination, temperature peaks) significantly better whilst reliably delivering dry compressed air.

Dependable condensate drainage

Integrated ECO-DRAIN electronic condensate drains installed as standard (all models except TA 5) deliver reliable condensate separation – without pressure loss. They are also insulated to protect against condensate formation on the exterior.



Reliable refrigeration circuit

The refrigerant circuit in SECOTEC refrigeration dryers is specially designed for efficient use of R-134a refrigerant. This ensures maximum efficiency and reliability, even at higher temperatures.

SECOTEC TA to TD series

Easy to maintain

KAESER understands customers' needs, as the company itself operates various compressed air stations. From first hand experience, we are well-versed in all aspects of compressed air station planning, implementation, operation and maintenance. We draw on this expertise to provide user-friendly and low-maintenance products.

Service-friendly condenser

The condenser is arranged on the front side of the unit where it is exposed to the air stream without an upstream mesh barrier. Any dirt accumulation on this component can therefore be easily detected and effectively removed, ensuring energy efficiency and pressure dew point stability over the long-term.

Excellent accessibility

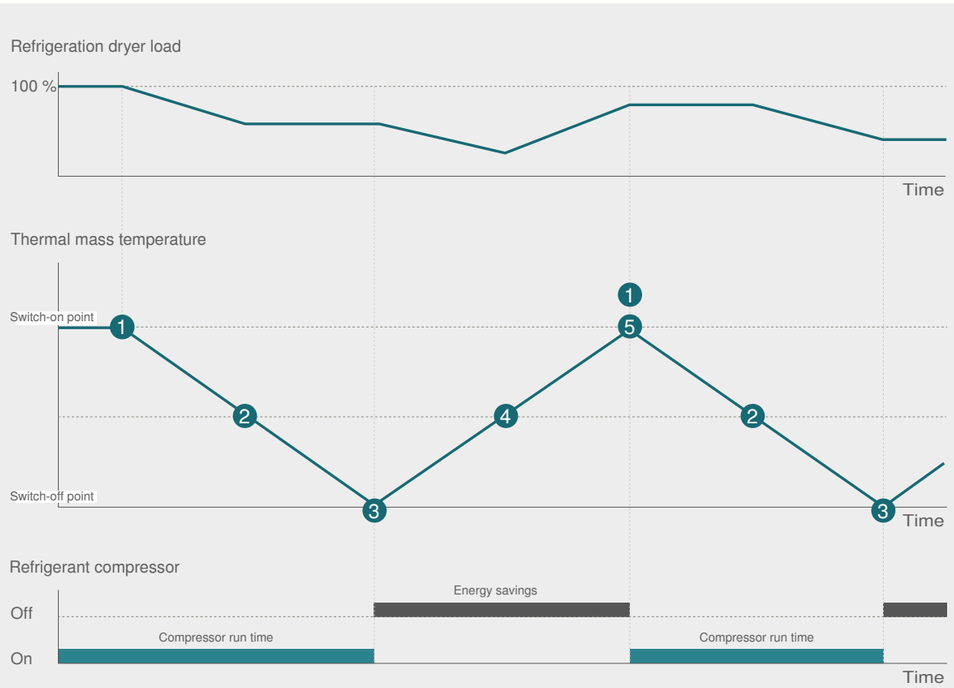
The SECOTEC refrigeration dryer's enclosure covers are quick and easy to remove, enabling straightforward service access. Taken together, these advantages significantly reduce servicing requirement and therefore costs.

Easy-to-test refrigeration circuit

KAESER service technicians and our partners' technical staff are refrigeration technology experts. They not only check operation of the refrigeration dryer, but also of the cooling circuit itself using intake- and pressure-side service valves.

Checked for leaks and proper function

All wearing ECO-DRAIN components can be replaced with the service unit replacement with no need to replace the seal. The condensate drain and service unit are 100% factory-tested for leaks and proper functioning before leaving the plant.



SECOTEC thermal mass control

Partial-load control with powerful thermal mass

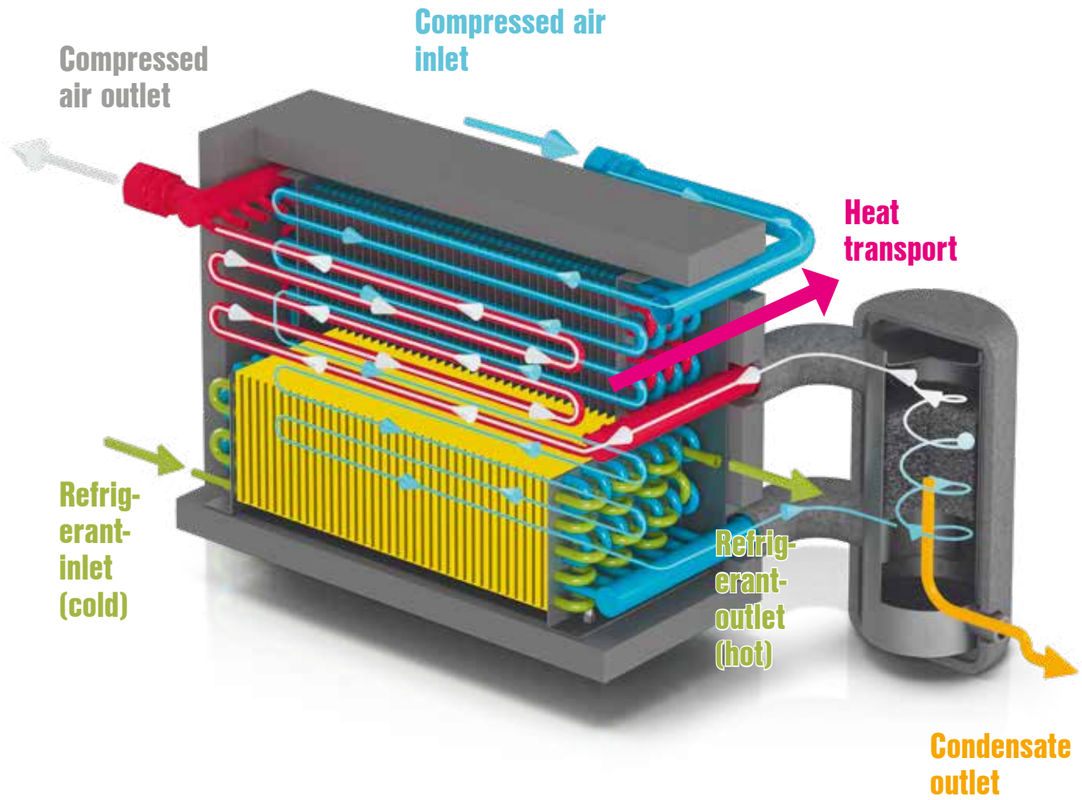
(1) Refrigerant compressor runs:
Cooling is supplied for compressed air drying and cooling of the thermo-storage granules.

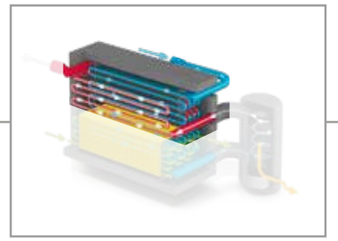
(2) Cooling capacity not required for compressed air drying continues to cool the storage medium until the switch-off point.

(3) Refrigerant compressor switches off.

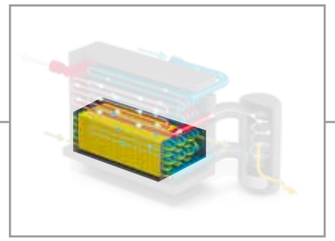
(4) Storage granulate supplies cooling for compressed air drying and warms up.

(5) Refrigerant compressor switches on.
Thermo-storage granules warm up until the refrigerant compressor switch-on point is reached.

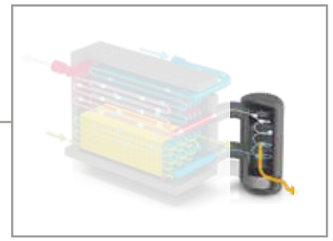




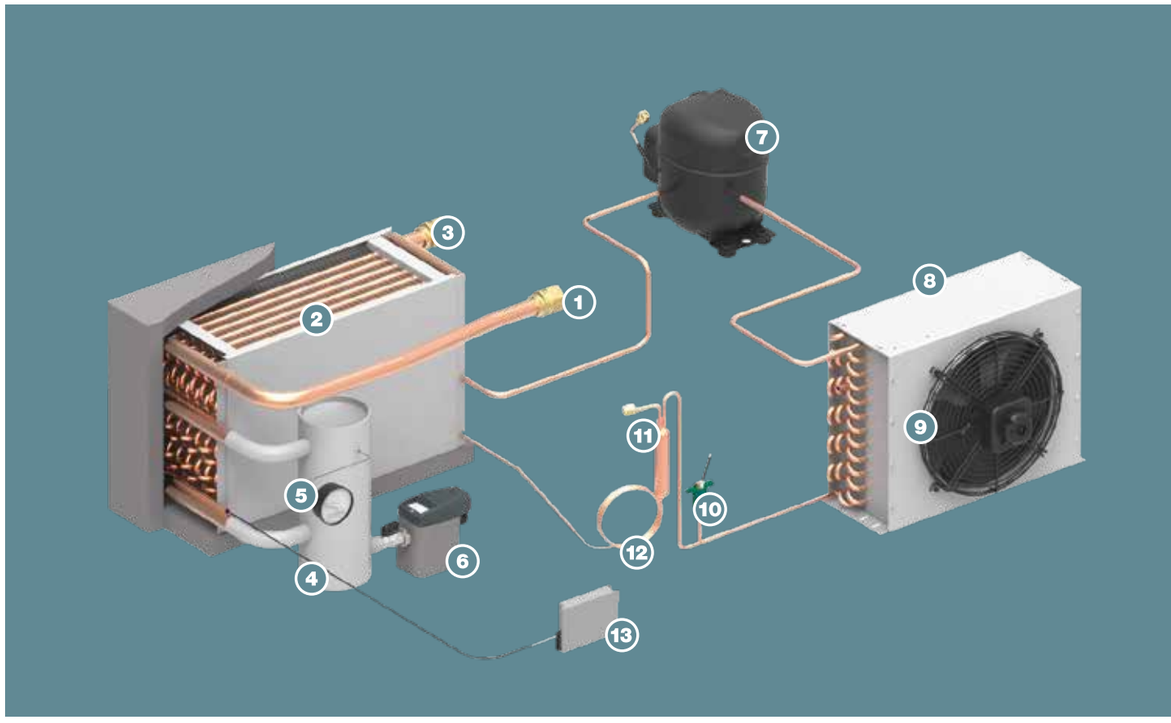
Air / air heat exchanger



Air / refrigerant heat exchanger with thermal mass (yellow area)



Condensate separator



SECOTEC solid thermal mass

Large storage capacity – large energy savings

TA to TD-series SECOTEC refrigeration dryers are equipped with a powerful solid thermal mass. Unlike conventional refrigeration dryers with switching operating modes and without an additional thermal mass, in SECOTEC dryers the entire air-refrigerant heat exchanger is embedded in thermo-storage granules and encased in efficient heat protection.

Compared to conventional refrigeration dryers, this provides significantly higher storage capacity whilst also reducing load on the refrigerant compressor and fan motor. During partial load operation, the smooth copper pipe transfers unneeded cooling capacity to the thermo-storage granules located in the intermediate spaces of the piped-fin heat exchanger, where it can be fed back into the smooth copper pipes of the compressed air circuit (also located there) as needed. This enables the refrigerant compressor and fan motor to remain switched off for an especially long time – for greater energy savings.

The result:
High storage capacity with low energy consumption on an as-needed basis, with stable pressure dew point and low-wear operation.

Layout

(1) Compressed air inlet
(2) Heat exchanger system with SECOTEC solid thermal mass
(3) Compressed air outlet
(4) Condensate separator
(5) Dew point trend display
(6) ECO-DRAIN condensate drain
(7) Refrigerant compressor
(8) Refrigerant condenser
(9) Fan
(10) High-pressure switch
(11) Filter dryer
(12) Capillaries
(13) Control unit

New system planning

It’s time to reset the clock

Are you forcing yourself to live with a compressed air station that has grown over the years and yet no longer meets present requirements? Or are you planning a new system and searching for solutions with outstanding long-term efficiency?

As your experienced **compressed air system solutions partner** we understand every imaginable scenario. And in addition to providing the best compressed air supply, we always keep in mind your business as a whole. It’s how we help you design your optimal compressed air future – whether you have two employees or 20,000.

Convenient one-stop shop
As a compressed air system provider we not only supply compressors and compressed air treatment components, we also supply the control equipment and even the complete infrastructure, when necessary.

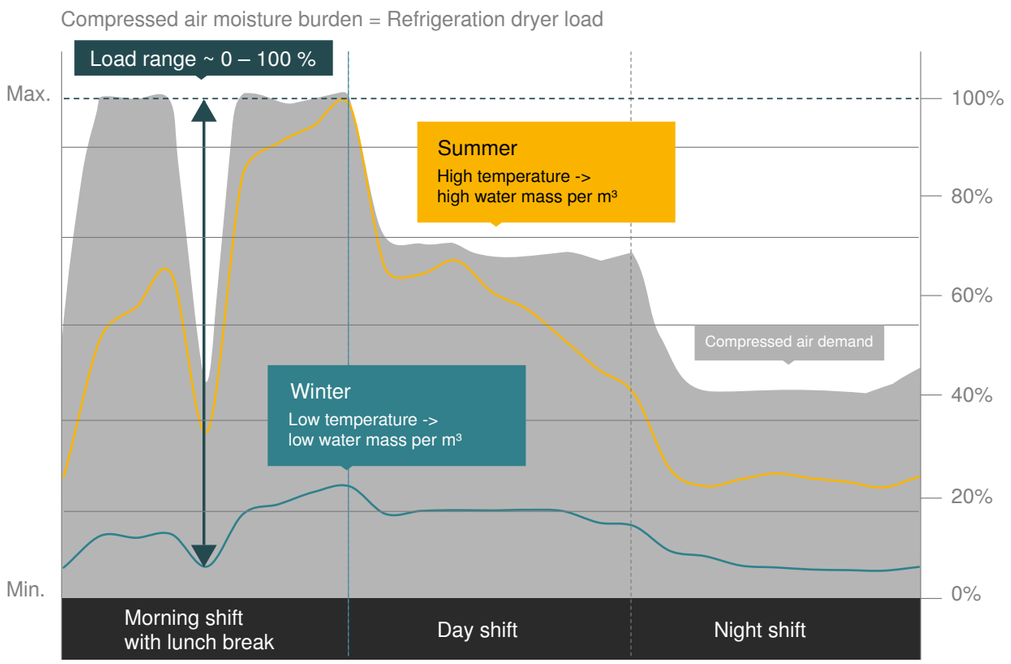
Our experience, your success
From mining to brewing, from Bavaria to Bahrain – our customers benefit from our experience as a global player – with all conceivable sectors and on-site conditions.

Long-term cost savings
Optimal consulting, technical advantage in research and manufacturing, and a highly efficient service organisation providing protection against downtime: Kaeser customers benefit from lower life-cycle costs.

Image: Compressed air system solution

SECOTEC

The key to perfect refrigeration drying

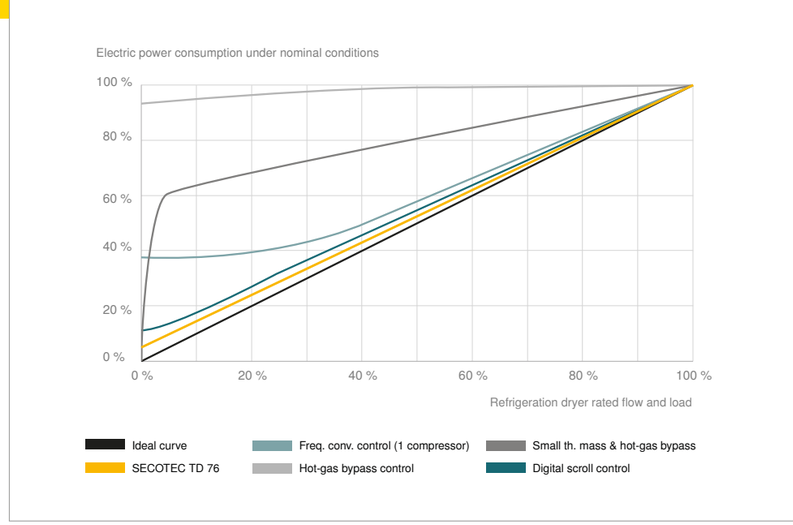


SECOTEC – Savings for all seasons

The load on a refrigeration dryer doesn't just depend on the volume of compressed air to be dried (grey area), but more importantly depends on how much water the incoming compressed air contains. The volume of water (moisture) increases as the temperature rises, so the load on refrigeration dryers increases dramatically when ambient temperatures are high, such as during summer (yellow curve).

The lower temperatures during winter (teal blue curve) therefore reduce the load on refrigeration dryers accordingly. To maintain a stable pressure dew point throughout all these fluctuations, refrigeration dryers should always be designed to provide sufficient performance during peak load times, and should also have additional capacity reserve.

Aside from these fluctuations in air flow and temperature, the output of refrigeration dryers constantly varies between 0 and 100 % of capacity. Because the SECOTEC thermal mass control ensures energy is only used as needed across this entire load range, users benefit from exceptional savings.

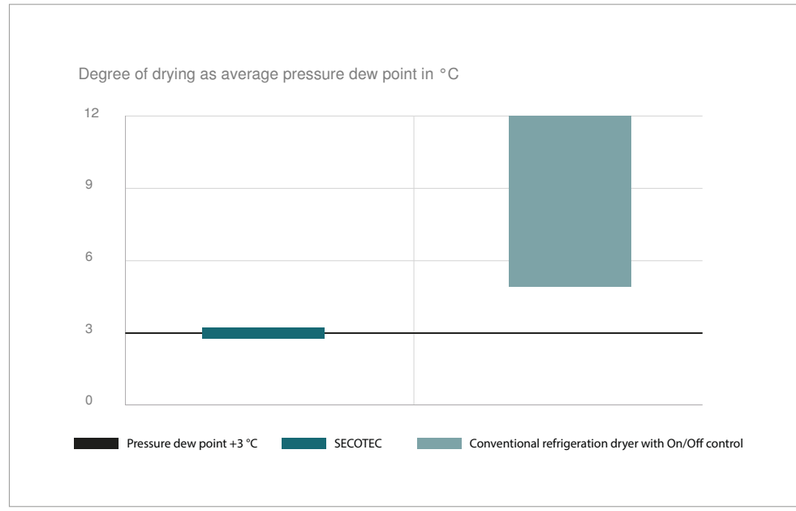


Maximum energy savings thanks to thermal mass control

Refrigeration dryer load constantly fluctuates between 0 and 100 %. Unlike conventional partial-load control systems, SECOTEC thermal mass control precisely adjusts electrical power consumption during all load phases.
This allows SECOTEC refrigeration dryers to save almost 60 % of energy costs compared to refrigeration dryers with hot gas bypass control running at an average of 40 % of capacity. **The TD 76 model typically saves 4,000 kWh/year based on 6,000 operating hours.** In contrast to conventional systems, the thermal mass in SECOTEC dryers always remains cool.

This means compressed air can be dried effectively even during start-up phases. The high-quality insulation around the thermal mass also helps keep energy usage to a minimum. Compressed air drying with SECOTEC refrigeration dryers not only ensures exceptional energy efficiency, but also, thanks to their impressive thermal capacity, provides low-wear operation.

Optimal drying with low-wear operation



SECOTEC refrigeration dryers ensure stable pressure dew points in all load phases. Dried compressed air can cool to a temperature of + 3 °C (= achievable pressure dew point) without the moisture in the air condensing. Compressed air distribution systems and connected equipment enjoy optimal protection, even at lower ambient temperatures.

Conventional refrigeration dryers with switching operating modes, but without an additional thermal mass, use the heat exchanger material itself as a thermal mass. In these dryers it is therefore necessary to switch the refrigerant compressors and fan motors on and off much more frequently in order to maintain the required cooling performance.

To reduce switching frequency and wear, the refrigerant circuit therefore only switches on at much higher pressure dew points. The resulting fluctuations in the pressure dew point negatively affect drying performance. This can be risky, since corrosion can take hold even with relative compressed air humidity of 40% – corrosion can therefore occur even without condensate formation. SECOTEC refrigeration dryers, on the other hand, ensure material-friendly operation thanks to their high thermal storage capacity. Once the thermal mass has been charged, the refrigerant compressor and fan motor can remain switched off for much longer without impacting pressure dew point stability.

Equipment

Refrigeration circuit

Refrigeration circuit comprising refrigerant compressor, condenser with fan, high-pressure switch, filter dryers, capillary tubes, heat exchanger system featuring SECOTEC solid thermal mass.

SECOTEC solid thermal mass

Air/refrigerant copper-piped flow-fin heat exchanger embedded in thermo-storage granules, stainless-steel separator, air/air copper-piped flow-fin heat exchanger (TA 8 and up), heat insulation jacket and temperature sensor.

SECOTEC CONTROL

Controller for SECOTEC thermal mass control, dew point trend display, status LED for storage/load mode.

Condensate drainage

ECO-DRAIN 30 electronic condensate drain with ball valve on the condensate inlet line, incl. insulation of cold surfaces.

Enclosure

Power-coated enclosure with machine mounts and removable side panels for service access.

Connections

Smooth-bore copper compressed air piping, brass compressed air connections with rotation lock, bulkhead fitting for connection of external condensate line, and cable tunnel for network connection on the rear wall.

Electrical equipment

Electrical equipment and testing to EN 60204-1 “Safety of machinery”. IP 54 integrated control cabinet protection rating.

Calculating flow rate

Correction factors for deviating operating conditions (flow rates in m³/min x k...)

at deviating gauge working temperatures (bar)														
bar	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Factor	0.75	0.84	0.90	0.95	1.00	1.04	1.07	1.10	1.12	1.15	1.17	1.19	1.21	1.23

Compressed air inlet temperature T_i							
T_i (°C)	30	35	40	45	50	55	60
k_{Ti}	1.20	1.00	0.83	0.72	0.60	0.49	

Ambient temperature T_a					
T_a (°C)	25	30	35	40	43
k_{Ta}	1.00	0.99	0.97	0.94	0.92

Example:			
Gauge working pressure:	10 $bar_{(g)}$	(See table)	k_p = 1.10
Compressed air inlet temp.:	40 °C	(See table)	k_{Ti} = 0.83
Ambient temperature:	30 °C	(See table)	k_{Ta} = 0.99

TC 44 refrigeration dryer with flow rate of 4.4 m³/min
Max. possible flow rate under operating conditions
V_{max} operation = $V_{Reference}$ x k_p x k_{Ti} x k_{Ta}
V_{max} operation = 4.4 m³/min x 1.1 x 0.83 x 0.99 = 3.8 m³/min

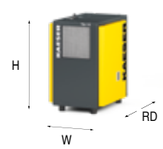
Technical specifications

Model		TA Series			TB Series		TC Series			TD Series		
		5	8	11	19	26	31	36	44	51	61	76
Flow rate [1]	m³/min	0.60	0.85	1.25	2.10	2.55	3.20	3.90	4.70	5.65	7.00	8.25
Pressure loss, refrigeration dryer [1]	bar	0.07	0.14	0.17	0.19	0.20	0.15	0.16	0.15	0.11	0.15	0.17
Elect. power consumption at 100 % flow rate [1]	kW	0.29	0.29	0.28	0.55	0.64	0.76	0.95	1.13	0.86	1.10	1.40
Elect. power consumption at 50 % flow rate [1]	kW	0.17	0.15	0.15	0.30	0.34	0.41	0.48	0.49	0.47	0.61	0.77
Weight	kg	70	80	85	108	116	155	170	200	251	251	287
Dimensions W x D x H	mm	630 x 484 x 779			620 x 540 x 963		764 x 660 x 1009			1125 x 759 x 1187		
Compressed air connection	G	¾			1		1 ¼			1 ½		2
Condensate drain connection	G	¼			¼		¼			¼		
Electrical connection		230 V / 1 Ph / 50 Hz			230 V / 1 Ph / 50 Hz		230 V / 1 Ph / 50 Hz			400 V / 3 Ph / 50 Hz		
R-134a refrigerant weight	kg	0.28	0.22	0.36	0.60	0.58	0.76	0.95	1.13	1.25	1.28	1.50
Weight of R-134A refrg. as CO_2 equivalent	t	0.4	0.3	0.5	0.9	0.8	1.1	1.4	1.6	1.8	1.8	2.1
Hermetic refrigeration circuit as defined by F-gases reg.		Yes			Yes		Yes			Yes		
Options / Accessories												
Floating contacts: refrigerant compressor running, high pressure dew point		Optional			Optional		Standard			Standard		
Floating contacts: refrigerant compressor running, high pressure dew point, condensate drain alarm		Not available			Optional		Optional			Optional		
Adjustable machine mounts		Optional			Optional		Optional			Optional		
Separate autotransformer for adapting to deviating mains voltages		Optional			Optional		Optional			Optional		
Special colour (RAL)		Optional			Optional		Optional			Optional		
Silicone-free version (VW factory standard 3.10.7)		Optional			Optional		Optional			Optional		

Note: Suitable for ambient temperatures of +3 to +43 °C. Max. compressed air inlet temperature +55 °C; positive pressure min./max. 3 to 16 bar; contains R-134a fluorinated greenhouse gas (GWP = 1,430)

[1] As per ISO 7183, option A1: Point of reference: 1 bar(g), 20 °C, 0 % relative humidity; operating point: pressure dew point +3 °C, working pressure 7 bar(g), inlet temperature 35 °C, ambient temperature 25 °C, 100 % relative humidity

TA series



TB series

TC series

TD series

The world is our home

As one of the world's largest compressed air system providers and compressor manufacturers, KAESER KOMPRESSOREN is represented throughout the world by a comprehensive network of branches, subsidiary companies and authorised partners in over 140 countries.

With innovative products and services, KAESER KOMPRESSOREN's 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.

Moreover, the decades of knowledge and expertise from this industry-leading system provider are made available to each and every customer via the KAESER group's global computer network.

These advantages, coupled with KAESER's worldwide service organisation, ensure that every product operates at the peak of its performance at all times and provides maximum availability.

HPC Compressed Air Systems

HPC Compressed Air Systems, Victoria Gardens, Burgess Hill, West Sussex RH15 9RQ
Tel: 01444 241671 **Fax:** 01444 247304 **E-Mail:** info@hpcplc.co.uk **www.hpccompressors.co.uk**

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