KAESER COMPRESSORS

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Hybritec Combination Dryer

Flow rate 20 to 150 m³/min

KAESER COMPRESSORS

What do you expect from a compressed air dryer?

Most industrial applications require a source of quality, dry compressed air to prevent the accumulation of condensate in air distribution networks and to minimise the associated risk of costly system failures.

The pressure dew point (PDP) is the temperature at which compressed air reaches its humidity saturation point under pressure. Once the PDP is reached, any further reduction in temperature results in the accumulation of condensation. The required PDP for any given application should therefore be achieved as efficiently as possible. Refrigeration drying is the preferred method of compressed air treatment for pressure dew points down to +3 °C, whilst desiccant dryers, for example, are used for PDPs below +3 °C, although these systems consume significantly more energy.

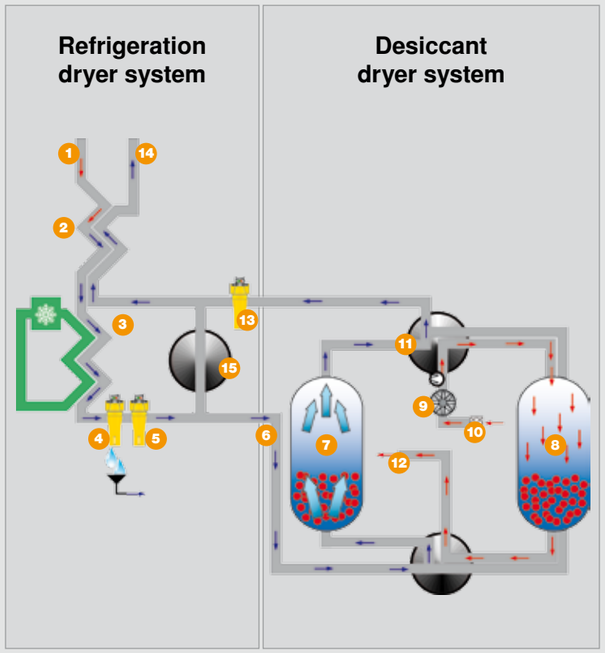
However, KAESER KOMPRESSOREN has developed a ground-breaking compressed air drying solution with the introduction of its 'Hybritec' series. 'Hybritec' dryers deliver the very best of both worlds, as they combine the energy-saving functionality of modern refrigeration dryers with the exceptionally low pressure dew points of desiccant dryers. Available for free air deliveries from 20 m³/min and providing unrivalled efficiency for PDPs down to -40 °C, 'Hybritec' dryers can be precisely tailored to meet the needs of the specific application. Users are therefore able to benefit from optimum system reliability and cost-effective compressed air drying year-round.

Hybritec – In a Class of its Own

CE

Made in Germany!

Hybritec system layout



1. Compressed air inlet
2. Air / air heat exchanger
3. Air / refrigerant heat exchanger
4. Condensate separator
5. Microfilter at the coldest point
6. Desiccant dryer inlet
7. Desiccant chamber in adsorption phase
8. Desiccant chamber in regeneration phase
9. Fan
10. Fan intake filter
11. Heating
12. Purge air outlet
13. Particulate filter
14. Compressed air outlet
15. Switchover unit for "Summer / Winter mode"

Compact, turn-key unit

Hybritec dryers are quick and easy to install. The system, which uses standardised components, is installed ready for operation on a base-frame. Quick, simple, effortless.

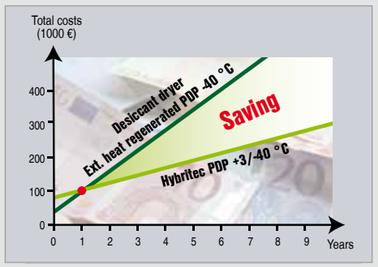
(Image shows DTG to DTI series)

Automatic temperature sensing

Equipped with a dependable thermostat control system, Hybritec dryers are able to automatically switch from frost protection operation at colder times of the year to pure refrigeration dryer mode during the warmer months.

10-year desiccant service life

The reduced thermal and mechanical demands that are placed on the Hybritec's desiccant dryer section not only significantly extend desiccant service life, but also mean that less desiccant material is actually required. Service costs are therefore kept to an absolute minimum.

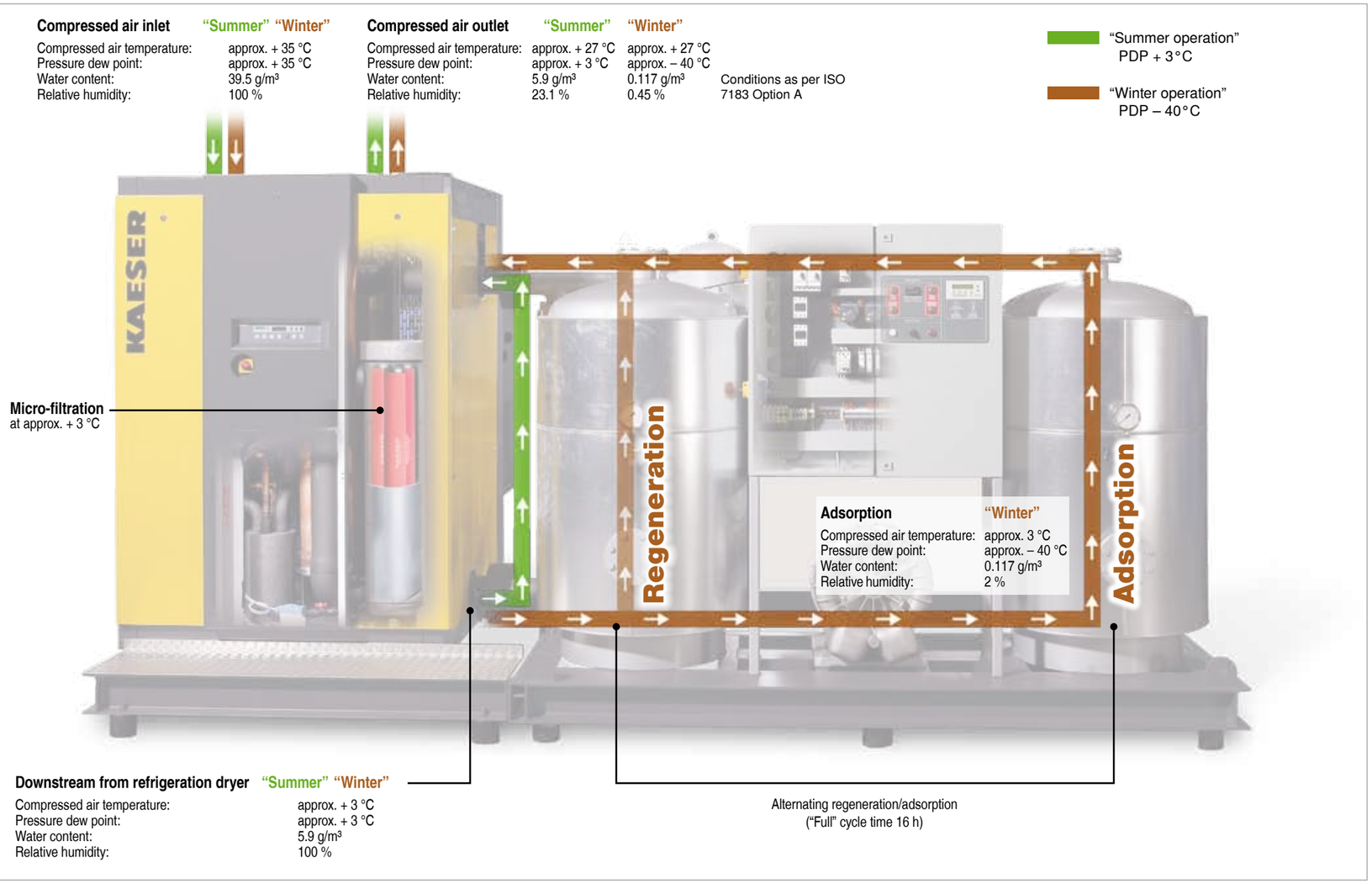


System comparison (Total lifetime)

Compared with conventional desiccant compressed air dryers, no other system comes close to Hybritec dryers when it comes to lowest total lifetime costs. This is mainly due to the Hybritec's lower energy consumption and the fact that these versatile dryers become even more cost-effective as energy prices increase. Hybritec dryers are also cleaner and therefore require less maintenance and, because they require less energy, are more environmentally friendly.

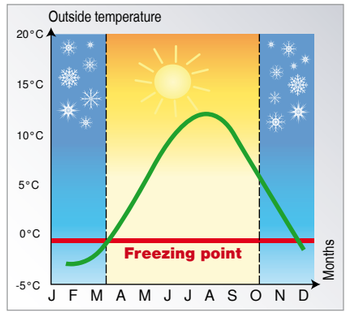
(Calculation applies to: DTL 833/1101,1/3summer-/2/3winter operation, 8760 operating hours per year, 0.15 €/kWh)

Hybritec – Superior efficiency



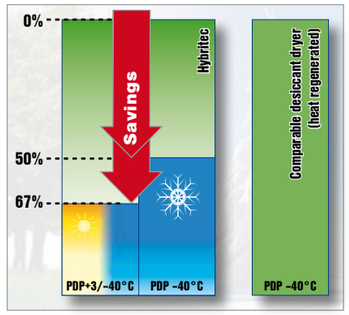
Seasonal temperature profile

The Hybritec's combination approach for applications requiring frost protection has clear energy advantages both over stand-alone desiccant dryers and separate components installed in series. These advantage become even more pronounced with rising energy prices and shorter, less frequent periods of frost and sub-zero temperatures.



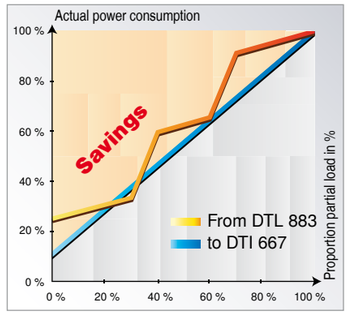
Energy savings

Hybritec dryers can provide significant savings compared with single-stage heat regenerated desiccant dryers. With an assumed frost period of 4 months a year for example, it is possible to reduce energy costs by up 67%. Even if the system is used to provide a pressure dew point of -40 °C year-round, the energy saving potential can still be as high as 50%.



Modulating control

The modulating control systems, fitted as standard, enable additional energy savings. Digital scroll control is available for refrigeration dryers with flow rates up to 66.7 m³/min, whilst cylinder shutdown is also used to precisely control the refrigerant compressor. In addition, the desiccant dryer features a PDP sensor and a corresponding regulator to adjust cycle times.



Drying process	Pressure dew point °C	Typical specific power requirement kW / m³/min**)
Refrigeration dryer	+ 3	0.1
Hybritec	**+ 3 / – 40 *)**	**0.2**
	– 40	**0.3**
Heat regenerated desiccant dryer	**– 40**	**0.5 – 0.6**
Heatless regenerated desiccant dryer	+ 3	1.4 – 1.6
	– 40	

*) PDP – 40 °C for1/3of operating time **) as per ISO 7153 Option A

Outstanding efficiency with low pressure dew points

Hybritec dryers offer an exceptional level of standardisation for both the desiccant and refrigeration drying stages, yet ensure outstanding flexibility when it comes to providing a tailored solution in order to meet the needs of a specific application. Moreover, such standardised processes ensure consistent production quality. KAESER is currently the only compressed air systems provider to offer combination solutions in this way. If pressure dew points of <+3 °C are required for flow rates from 20m³/min, then it is seriously worth considering the use of a Hybritec system, especially in view of the significant savings that can be achieved. KAESER's experts are able to provide a detailed cost analysis comparison for any application and will advise the customer accordingly as to which approach is the most efficient to meet his / her needs.

3x longer cycle time

Due to the lower temperature and significantly reduced moisture content of the air coming from the refrigeration dryer, Hybritec systems require far less desiccant than conventional desiccant dryers, as the desiccant's adsorption capacity is optimised. In fact, more desiccant is used than is actually required, because the compressed air has to maintain certain flow rates. This saves energy, as the extra desiccant considerably extends the Hybritec's drying cycle time to 16 hours (PDP: -40 °C); 6 hours is common for conventional desiccant dryers. This longer cycle time means that the drying process does not have to be switched between the Hybritec's chambers as frequently and thereby minimises the volume of dried compressed air that is purged into the ambient surroundings each time this process takes place.

Equipment – Hybritec Combination Dryer

Refrigeration dryer system

Switch cabinet with energy-saving control

For all refrigeration dryers:
- Air/air and air/refrigerant plate heat exchanger and condensate separation system made from stainless steel
- According to model, at least 2 ECO Drain electronic condensate drains
- Integrated FE micro-filter installed at the coldest point
- All cold system components insulated
- Insulated bypass with shut-off valve for “Summer / Winter operation”
- Powder-coated enclosure panels
- All materials used are CFC-frei

Serien DTG bis DTI
- Energy saving scroll refrigerant compressor with adjustable refrigerant compression
- Refrigerant R404a
- Control panel with:
  Display / indicators: Two-line plain text display with 10 selectable languages; indicators for, amongst others, alarm messages and energy saving LED status indicators: “Power ON”, “Refrigerant compressor ON”, “PDP temperature indicator”

  Switch: ON/OFF, three programmable keys for timer, test button for electronic condensate drains, acknowledgement key and main switch

  Floating contacts: Group alarm and system status message

DTL series
- Refrigerant compressors with energy-saving cylinder shutdown
- Refrigerant R134a
- Control panel with:
  Inlet temperature, outlet temperature, pressure dew point temperature
  Indicator lights: Refrigerant compressor power level and group alarm

  Pressure gauge for evaporation pressure, condensing pressure, oil pressure, compressed air inlet, compressed air outlet, cooling-water inlet/-outlet (for water-cooled models)

  Switch: ON/OFF, acknowledgement key and main switch

  Floating contacts, refrigerant compressor alarm and group alarm “High pressure dew point, condensate drain, dryer off”

Desiccant dryer system

Load dependent ECO CONTROL DW with specially designed pressure dew point sensor

Control panel:
- Control:
  Plain text display with English and German language options; indicator for, amongst others, cycle phase, alarms

  Acknowledgement key

  Temperature and valve switching sequence monitoring

  Diagnostics mode with indicator for valve switching sequence

  Automatic mode for automatic start up
- Additional indicators/controllers:
  PDP display with adjustable PDP alarm value

  Temperature controller / indicator for regeneration-air temperature

  Light indicators: power supply current cycle phase, alarm
- Switch:
  ON/OFF and main switch
- Floating contact for group alarm
- Two desiccant chambers with stainless steel flow diffusers
- Stainless steel heat insulation for chamber and cold air lines
- Also for regeneration air lines, control air filter, valve cluster, temperature sensors, silencer
- Surfaces finished and coated
- 10 high quality changeover valves
- Radial layout of chamber in- and outlets

  Generously-sized connections for easy filling / emptying and for chamber inspections

  Disconnection of pipe bridges not necessary
- Moist compressed air and regeneration air is always fed against the direction of flow

  Enhanced conveying of moisture
  Minimal energy requirement for regeneration air production

  Reduced cooling air requirement
- Regeneration implemented via side channel fans, upstream inlet filter and external heating element
- High quality SIGMA® Dry desiccant
- Easy access particulate filter installed upstream from refrigeration dryer inlet
- All materials used are CFC-free

Options
- Maximum pressure 16bar(g)
- Water-cooled refrigeration dryer
- Refrigeration dryer with speed controlled fan motors from DTL 883/1101 (W)
- Installation in 20-foot container up to installation size DTI 667/901
- Desiccant dryer with heat exchanger for hot gas regeneration
- Electronic filter monitoring (Filter monitors and monitor box from the microfilter)
- RAL custom colours
- Automatic switchover between “Summer / Winter operation”
- Mains power connection: 500V / 3Ph / 50Hz
- Additional soundproofing for purge process < 80 dB(A) (only up to DTI)

Technical Specifications – Hybritec

Model	Flow rate [1]	Air connection	Average effective total power consumption [2]				Weight	Dimensions W x D x H
			Air-cooled [3]		Water-cooled [4]			
	m³/min	DN	Discharge PDP +3 °C	Discharge PDP – 40 °C	Discharge PDP +3 °C	Discharge PDP – 40 °C	kg	mm
DTG 200/301 (W)	20.0	80	2.4	5.1	1.9	4.6	2,500	4300 x 1550 x 2250
DTH 250/371 (W)	25.0	100	3.4	6.8	2.8	6.2	2,700	4300 x 1550 x 2250
DTI 333/521 (W)	33.3	150	4.9	9.3	4.3	8.7	3,300	4600 x 1900 x 2250
DTI 417/601 (W)	41.7	150	6.1	11.4	5.3	10.5	3,500	4600 x 1900 x 2250
DTI 500/751 (W)	50.0	150	7.2	13.9	6.5	13.2	4,200	4600 x 1900 x 2250
DTI 667/901 (W)	66.7	150	9.9	18.4	8.3	16.7	4,350	4600 x 1900 x 2250
DTL 833/1101 (W)	83.3	150	11.1	20.8	10.0	19.7	5,500	5150 x 3250 x 2600
DTL 1000/1301 (W)	100.0	150	12.8	24.4	11.7	23.3	6,250	5150 x 3200 x 2600
DTL 1167/1501 (W)	116.7	200	13.7	27.0	12.6	25.9	7,300	5500 x 3600 x 2600
DTL 1333/1751 (W)	133.3	200	14.5	29.4	13.4	28.3	7,700	5500 x 3600 x 2600
DTL 1500/1775 (W)	150.0	200	18.5	34.2	17.4	33.1	8,900	5550 x 3700 x 2600

[1] ISO 7153, Option A: Reference conditions 1 bar(a), 20 °C, rel. humidity 0% - Operation reference: Inlet pressure 7 bar(g), inlet temperature +35 °C, ambient temperature 20 °C, rel. ambient humidity 70 %, rel. humidity at dryer inlet 100 %, cooling water temperature 25 °C and -deltaT 10 K
[2] Data determined over all cycle periods
[3] Includes RD fan, DD heating, DD fan, control systems
[4] Includes DD heating, DD fan, control systems

(W) Also available with water-cooled refrigeration dryer

Min./max. operating pressure:	4/10 bar(g)
Min./max. inlet temperature:	+ 3 / +49 °C
Min./max. ambient temperature:	+ 3 / +45 °C
Mains supply:	Standard 400V / 3Ph / 50Hz Optional 500V / 3Ph / 50Hz

Views

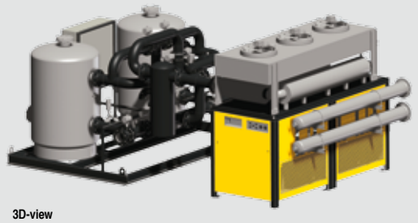
Hybritec DTG to DTI series

3D-view

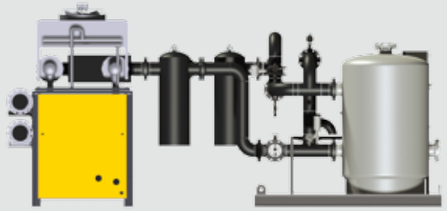
View from left

View from right

Hybritec DTL series



3D-view



View from right

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KAESER – The world is our home

As one of the world's largest manufacturers of rotary screw compressors, KAESER KOMPRESSOREN is represented throughout the world by a comprehensive network of branches, subsidiary companies and authorised partners in over 90 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 all products operate at the peak of their performance at all times and provide maximum availability.

LGA InterCert
Certified QM/EM System
ISO 9001:2008 / ISO 14001:2004

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