Donaldson
FILTRATION SOLUTIONS

Industrial Gases

Ultrapure HL - ALG 0100 -1000
Heatless Adsorption Dryer



PRODUCT DESCRIPTION

The Ultrapure HL - ALG dryer range is designed for drying and purifying of compressed air used in breathing or medical air applications reaching pressures up to 16 bar. The drying process is based on adsorption of water molecules out of a gas stream using hygroscopic desiccant materials. With this drying concept pressure dewpoints of -40°C (at 7 bar) or lower can be achieved. The unit also contains adsorbent that helps to remove other gaseous contaminates such as CO_2, SO_2 and NO_x.

The regeneration of saturated desiccant is achieved by using a partial steam of dry, purified compressed air for the desorption of water and other contaminants. Removing oil vapor and other hydrocarbons is achieved by adsorbing these contaminants in the AK/OX stage using activated carbon. Carbon monoxide (CO) is oxidated to carbon dioxide (CO_2) using a special catalyst in the AK/OX stage. Two prefilters with automatic electronic condensate drains and one afterfilter are included in the Ultrapure purification system.

An electronic controller enables automated control of all phases of the drying and regeneration cycle. It includes the Ultraconomy dewpoint monitoring and control system to help support energy efficient and reliable operation in the Superplus models.

MAIN FEATURES & BENEFITS

- **Heatless-regenerated adsorption dryer and purification system**

Robust and efficient design for achieving low pressure dewpoints even in challenging high ambient temperature and humidity conditions and help to achieve required purity levels of gaseous contaminants as CO_2, SO_2 and NO_x.

- **AK/OX stage including activated carbon adsorber and OX catalyst**

Substantial amount of activated carbon offers high adsorption capacity for removal of oil vapors, hydrocarbons and odors and supports long service life of the adsorbent even under challenging operating conditions. Carbon monoxide (CO) is oxidated on the OX catalyst to a residual content below the specified level for breathing air.

- **Pre- and afterfilters with UltraPleat™ media technology**

Complete purification system including high-efficiency filters for removal of oil and water aerosols as well as solid particles.

- **Superplus models with Ultraconomy dewpoint control**

Monitoring and dewpoint control support full utilization of desiccant capacity and triggers the regeneration process. This feature supports energy and cost savings as well as full drying performance control.

- **Automatic electronic zero-loss condensate drain with alarm function**

Eliminates the loss of compressed air during drain process under normal operating conditions.

- **Robust and reliable design and components**

Pressure vessels and pipe system are made of steel. Piping system utilizes press-design. The unit incorporates robust, long-life shuttle valves and solenoid membrane valves for enhanced reliability and ease of maintenance.

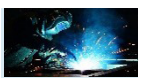
INDUSTRIES



- Medical / Hospital Applications



- Laboratories



- Industrial Breathing Air



- Automotive / Painting Application

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Technical alterations reserved (04/2025)

PRODUCT DESCRIPTION

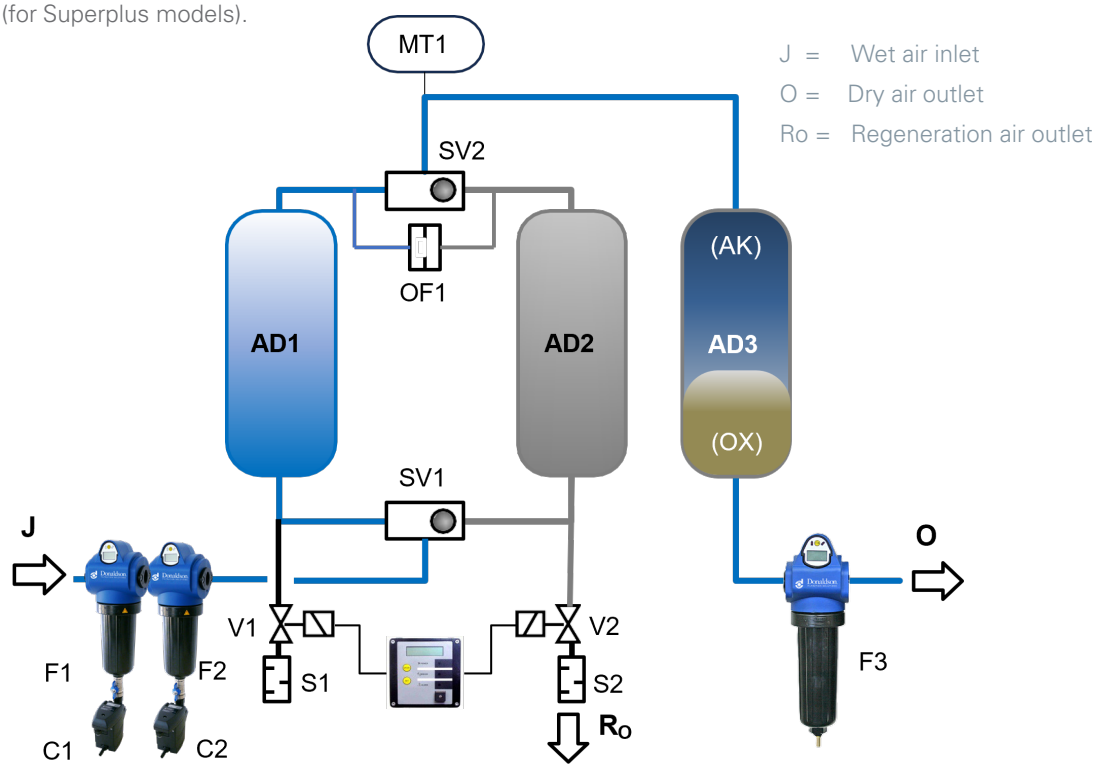
The Ultrapure HL - ALG dryer consists of an adsorption dryer with two adsorber vessels (AD1 / AD2) filled with desiccant and one adsober vessel (AD3) filled with activated carbon (AK) and a CO catalyst (OX). While one adsorber of the adsorption dryer is in the drying phase, the other adsorber is being regenerated. The activated carbon adsorber including OX catalyst is not regenerated and the activated carbon and OX catalyst must be replaced when saturated.

In the drying phase of the adsorption dryer compressed air is entering the unit at the wet air inlet (J) and passes the coalescing type prefilters F1 and F2 where oil and water aerosols are removed. Condensate is collected in the condensate drains C1 and C2 and automatically drained off the system. The wet air is led through the lower shuttle valve (SV1) into the adsorber AD1 (see example). As it flows through the adsorber from bottom to top it adsorbs the humidity as well as gaseous contaminants as CO_2, SO_2 and NO_x on the desiccant. Afterwards the dry air flows through the activated carbon adsorber AD3 from top to bottom, where oil vapor and other hydrocarbons are removed in the AK stage and carbon monoxide (CO) is removed in the OX stage. Finally, particles from the adsorbents and catalyst are retained on the after filter F3 before the purified air flows to the dry air outlet (O). The dewpoint is measured by the dew-point transmitter MT1 (for Superplus models).

While adsorber AD1 is in the drying/adsorption phase, adsorber AD2 is being regenerated. The pressure in adsorber AD2 is released via valve V2 (V1) and immediately a partial flow of dry and purified air is expanded through the orifice OF1 and flows from top to bottom through adsorber AD1. The dry regeneration air picks up the water and adsorbed contaminants from the desiccant and is released via the silencer S2 (S1) to the regeneration outlet Ro.

At the end of the regeneration phase valve V2 (V1) is closed and through the orifice OF1 pressure builds up in adsorber AD2 again until it is on the same pressure level as in adsorber AD1.

The switch-over for the adsorbers AD1 and AD2 from drying/adsorbing to regeneration or vice versa is triggered either in time-controlled mode (standard models) or by controlling the dewpoint on transmitter MT1 when the dewpoint limit value is exceeded (Superplus models).



PRODUCT DESCRIPTION

FEATURES	BENEFITS
Purification system including heatless-regenerated adsorption dryer and purification system with purge regeneration concept, activated carbon adsorber for removal of oil vapor, hydrocarbons and odors and OX catalyst for removal of carbon monoxide (CO).	Robust and efficient drying and purification design for achieving low pressure dewpoints even in high ambient temperature and humidity conditions, removal of gaseous contaminants as CO, CO_2, SO_2 and NO_x as well as oil vapor and hydrocarbons below the specified level for breathing air can be achieved.
Breathing air quality for medical and industrial applications	Pressure dewpoints of -40°C (Class 2 acc. to ISO8573-1:2010) or -70°C (Class 1 acc. to ISO573-1:2010) and a residual oil content of <0.01 mg/m³ (Class 1 acc. to ISO8573-1:2010) are achievable at appropriate sizing and operating conditions. Ultrapure HL- ALG can be used to provide breathing air quality that complies with relevant international standards such as Pharmacopée Européenne, DIN EN 12021 or USP 29-NF24.
Pre- and afterfilter with UltraPleat™ media technology included	Complete purification package with high oil- and water aerosol retention efficiency on prefilter and high particulate retention efficiency on afterfilter at low differential pressure included.
Two prefilters with electronic level-controlled condensate drains incl. function control and alarm message	Zero compressed air loss through condensate drain under normal operating conditions.
Ultraconomy dewpoint control (Superplus models)	Monitoring and control of dewpoint support full utilization of desiccant capacity for potential energy and cost saving opportunites as well as full drying performance control.
Electronic controller includes visualization of dryer status, alarm and service messages. Standard version with time-controlled operating mode. Superplus version with text display and dewpoint monitoring including Ultraconomy capacity control mode.	Reliable control of dryer operation and continuous monitoring of dryer status to help support energy efficient and reliable operation.
Remote On/Off contact (intermittent operation)	Remote control of dryer operation and link to compressor on/off-load contact possible to save purge air when compressor is not running.
10 dryer sizes up to 1000 m³/h nominal flow capacity	Wide range of dryer flow capacities and connection sizes help match user requirements.
Welded steel vessels and frame, press-fitting pipeline design	Robust, long-life, and service-friendly design
Shuttle valves and regeneration valves with flanged housings	Quick replacement of wear parts may reduce service and maintenance cost and lead to reduced downtime.
Econometer differential pressure indicators on pre- and afterfilters	Monitoring of filter particle contamination and enabling of on-time replacement of contaminated filter elements.

PRODUCT DESCRIPTION

In addition to the features already included in the standard dryer configuration a range of defined standard options are available.

OPTIONS	DESCRIPTION AND BENEFITS
Power supply voltages	230 V AC (50-60 Hz) power supply available as standard; 24 VDC, 115VAC (50-60 Hz) as option
Packaging options	Seaworthy packaging and vertical or horizontal wooden box packaging options available for special transport / storage conditions.
Purge orifice for specific operating pressure	Selection of specific orifice for dryer model, size and pressure
4-20 mA output signal	Dew-point signal can be transferred to on-site control or monitoring system (available for Superplus models).
Tropical version	Operation in short cycle mode allows selection of appropriate dryer model for operation at high inlet temperatures up to 50°C.
-70°C pressure dewpoint measuring system	Dewpoint measuring system in stainless steel material to support precise and reliable measurement of extreme low dewpoints.
Further options on request	Individual dryer configuration per customer requirements and custom-made solutions for other industrial gases available on request.

PRODUCT DESCRIPTION

TECHNICAL DATA	
Adsorber Vessel	
Pressure Vessel Material	Carbon steel
Design Data	Design pressure: 16 bar g Design temperature: -10°C / +60°C
Design, Manufacturing and Testing	Acc. to AD2000 / PED 2014/29/EU
Flow Distributor Material	Stainless steel
Piping	
Design Data	Flange pressure rating: PN16 Design pressure: 16 bar g Design temperature: 60°C
Piping Material	Carbon steel, galvanized
Design, Manufacturing and Testing	Acc. to PED 2014/68/EU
Filters	
Design Data	Design pressure: 16 bar g Design temperature: 65°C
Filter Housing Material	Aluminium
Design, Manufacturing and Testing	Acc. to PED 2014/68/EU
Electrical Controller	
Design	Circuit board controller with LED indicators (Standard) or LCD text display (Superplus)
Power Supply	230 V AC 50-60 Hz (Standard), 24 V DC (optional), 115 V AC 50-60Hz (optional)
Protection Class	IP 54, acc. to IEC/EN 60529
Potential-Free Alarm Contact	Included
Remote On/Off Contact	Included

PRODUCT DESCRIPTION

TECHNICAL DATA	
Nominal Standard Conditions	
Pressure Dewpoint	-40°C (at 7 bar g), -70°C…-40°C (depending on sizing and operating conditions)
Operating Inlet Pressure	7 bar g
Operating Inlet Temperature	35°C
Inlet Humidity	100% saturated
Compressed Air Purity	
Achievable Compressed Air Purity Classes acc. to ISO 8573-1:2010	HL- ALG: 1-2 : 1-2 : 1
Breathing Air Purity (residual content of impurity at standard condition at the entry)	
Particles	Class 1-2 : ISO 8573-1
Oil (liquid phase)	< 0,01 mg/m3 (class 1, ISO 8573-1)
Oil vapour and hydrocarbon	< 0,01 mg/m3 (class 1, ISO 8573-1)
Water vapour	PDP-40°C (= 0,11 g/m3) (class 2, ISO 8573-1)
CO_2	< 500 ppm
CO	< 5 ppm
SO_2	< 1 ppm
NO_x	< 2 ppm
Operating Limits	
Media	Compressed Air
Operating Pressure	4 - 16 bar g
Operating Temperature	5 - 50°C
Ambient Temperature	5 - 50°C
Installation	Indoor

PRODUCT DESCRIPTION

Technical Data					
HL-ALG	Nominal Volume Flow (1 bar g, 20°C) m^3/h [1]	Purge Air Consumption, average m^3/h (1 bar g, 20°C)	Volume Flow Outlet, min. m^3/h (1 bar g, 20°C)	Differential Pressure, initial mbar	Pre- and Afterfilter M+S, with UltraPleat™ media technology
0100	100	20	75.4	115	0210
0150	150	30	113.1	340	0210
0175	175	35	132.0	305	0210
0225	225	45	170.0	190	0450
0300	300	60	226.2	230	0450
0375	375	75	282.8	370	0450
0550	550	110	414.7	315	0750
0650	650	130	490.1	380	0750
0850	850	170	640.9	385	1100
1000	1000	200	754.0	455	1100

[1] Nominal flow at 7 bar g, 35°C; [2] at nominal flow

SIZING

Type	Pressure Dewpoint (PDP)	Residual water content	Inlet Temp.	Operating Pressure (bar g)												
				4	5	6	7	8	9	10	11	12	13	14	15	16
ALG	≤ -40°C* PDP ≥ -70°C*	0.11 g/m³ 0.0027 g/m³	25°C	0.75	0.90	1.05	1.20	1.35	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55
			30°C	0.69	0.83	0.96	1.10	1.24	1.38	1.51	1.65	1.79	1.93	2.06	2.20	2.34
			35°C	0.63	0.75	0.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.00	2.13
			40°C	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70
			45°C	0.44	0.53	0.61	0.70	0.79	0.88	0.96	1.05	1.14	1.23	1.31	1.40	1.49
			50°C	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00	1.06
* on request				Correction factors (f)												

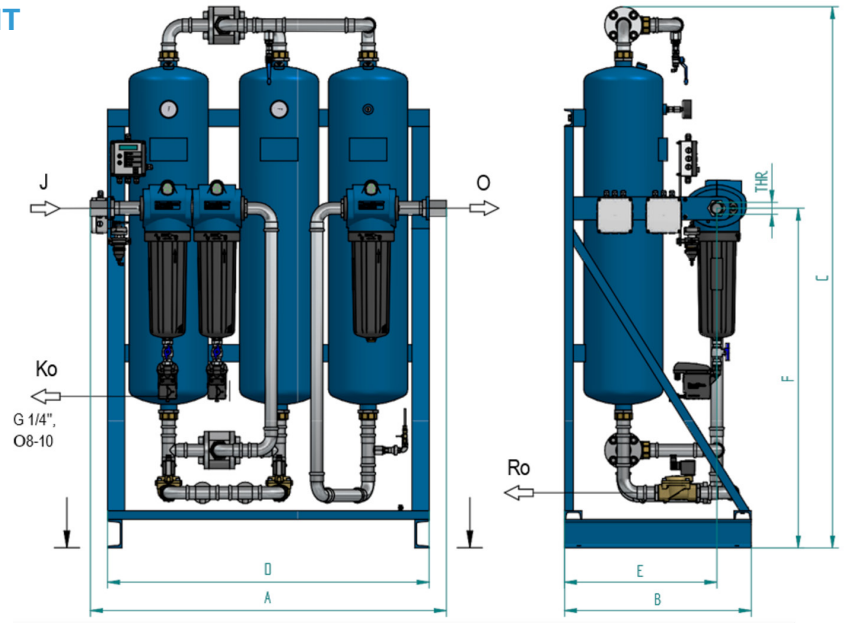
Example:

V_{nom} = 200 m^3/h, inlet temperature = 30°C, operating pressure = 10 bar (g), PDP = -40°C

$$Vcorr = \frac{Vnom}{f} = \frac{200\ m^3/n}{1.51} = 132.5\ m^3/h$$

Calculated dryer size:
ALG, Type 0150

DIMENSIONS / WEIGHT



HL-ALG	A mm	B mm	C mm	D mm	E mm	F mm	THR BSP	Weight kg
0100	955	450	1610	850	370	900	1"	205
0150	1005	450	2040	900	370	1100	1"	245
0175	1230	650	1900	1120	530	1185	1"	325
0225	1240	650	1900	1120	530	1185	1 ½"	325
0300	1240	650	1890	1120	530	1185	1 ½"	385
0375	1240	650	2220	1120	520	1300	1 ½"	495
0550	1630	750	2220	1490	635	1370	2"	530
0650	1630	750	2220	1190	635	1370	2"	630
0850	1810	850	2320	1670	730	1500	2"	750
1000	1810	850	2330	1670	730	1500	2"	860

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