



Donaldson  
FILTRATION SOLUTIONS

## Dryer Systems

### Heat Regenerating Adsorption Dryers

### Ultradryer HRS-L 1000 - 13600

#### MAIN FEATURES & BENEFITS

- 15 sizes available, matching to the compressor flow capacities
- Energy-efficient regeneration (desorption) in counter-current flow
- Applicable in all climate zones due to cooling with blower air (zero purge) running in circular flow (loop)
- Pressure dewpoint of  $-40^{\circ}\text{C}$  as standard, individual cases down to  $-70^{\circ}\text{C}$  possible
- Robust design with welded steel vessels and flanged pipelines
- Service-friendly design of butterfly valves and pressure reducing valves for fast replacement of wearing parts
- Robust, efficient programmable controller of the latest generation, for which service and support are guaranteed beyond the next decade
- Touch Panel with a high operational comfort; The main menu shows a system overview with the operational data such as pressure, temperature, cycle of the vessels etc.
- Comprehensive option package: dewpoint dependent capacity control, start-up-device, free of silicone and parting agents, bypass line, filter extension etc.
- Suitable high-efficiency filters as pre- and afterfilter (option) ensure a low differential pressure for the complete unit and thus small operating costs



HRS-L 2750

#### INDUSTRIES



- Chemical and electrical industry



- Machine building industry and plant engineering / construction



- Automotive industry

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Donaldson®  
Ultrafilter

PRODUCT DESCRIPTION

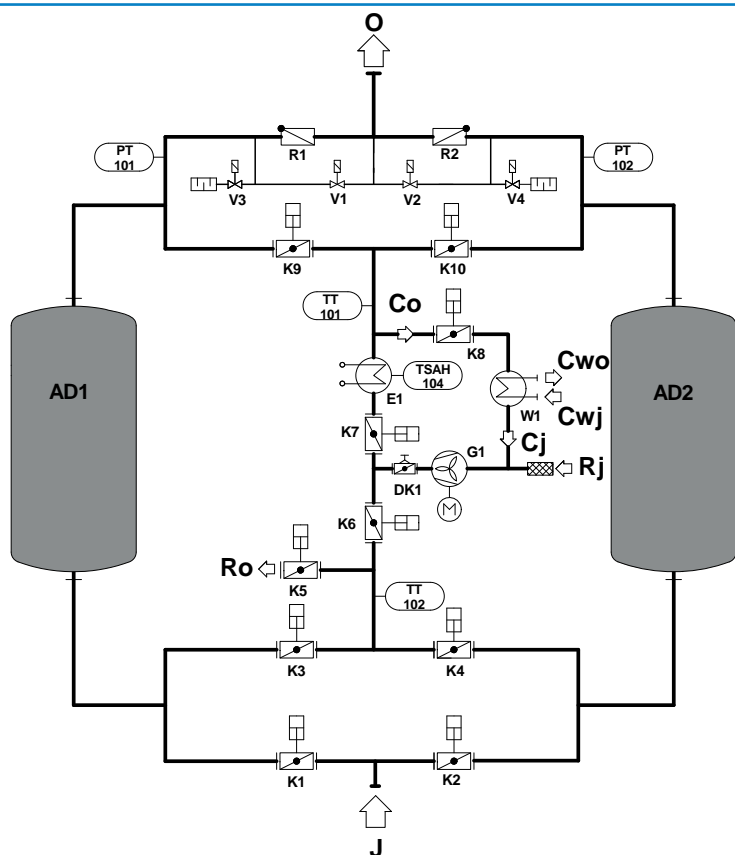
The externally heat regenerated adsorption dryers HRS-L 1000-13600 work according to the dynamic adsorption principle. Wet compressed air streams through a desiccant bed. While streaming through, moisture is drawn out of the compressed air. Since the adsorption capacity of the desiccant is limited, the flow direction has to be changed before the desiccant is completely saturated. Using two parallel adsorption vessels (adsorbers AD1 + AD2) with alternating function, the permanent supply of dried air for consumers is guaranteed.

One adsorber is always available for drying the compressed air. The second adsorber is regenerated at the same time. The activation time respectively the regeneration time is always shorter than the loading time of the working adsorber. The regeneration of the saturated desiccant is realized in two steps:

1. Desorption in counter-current flow to the adsorption direction with externally heated blower air
2. Cooling of the heated desiccant with blower air running in circular flow (loop)

Typical applications for the adsorption dryers HRS-L are:

- **Central compressed air purification**  
Generation of dry, oil-free and particulate-free compressed air (with option pre- and afterfilter)
- **Point-of-use applications**  
Drying and purification of control and instrument and process air
- **Automotive industry**  
Purification of compressed air for painting applications



- J: Wet air - inlet
- O: Dry air - outlet
- Rj: Desorption air - inlet
- Ro: Desorption air - outlet
- Cj: Cooling air - inlet
- Co: Cooling air - outlet
- Cwj: Cooling water - inlet
- Cwo: Cooling water - outlet

## PRODUCT SPECIFICATIONS

Features:	Benefits:
15 sizes available, matched to the compressor flow capacities	Custom made solutions possible, matching exactly customer's requirements; no oversizing of compressors necessary, due to no regeneration air requirements
Energy-efficient regeneration (desorption) in counter-current flow	Low desorption temperature, less energy consumption, no compressed air consumption (zero purge)
Cooling of the heated desiccant with blower air running in circular flow (loop)	Independent of ambient temperature and humidity, applicable in tropical environment, no compressed air consumption (zero purge), if necessary also very low dewpoints (PDP -70°C) realizable
Welded steel vessels and flanged pipelines	Robust service-friendly design
Easy accessibility of all components. Service-friendly design of pressure reducing valves and butterfly valves (two-piece housings)	Fast replacement of wearing parts ensure low service and maintenance cost and reduced downtime
Programmable logic controller Simatic S7-1200	Robust, efficient controller of the latest generation, custom made solutions possible
Touch Panel KTP600	High operational comfort due to self-explaining menu. All operational data on one view. Indication of current dewpoint (option) and function status as well as alarm and service messages on the main menu ensures high operating safety of the adsorption dryer
Comprehensive option package: Dewpoint depending control, start-up device, free of silicone and parting agents, bypass, filter extension etc.	Flexibility in application, well thought option package for economic operation and safe system installation in the compressed air network
Suitable high-efficiency filters as pre- and afterfilter available (option)	Low differential pressure of the complete unit and thus small operating costs
Ultraconomy version including dewpoint dependent capacity control (option)	Saving of energy and operational costs due to adaption of the adsorption cycle to the current operating conditions

Technical Data	
<b>Adsorption vessel</b>	
Material:	Carbon steel
Design data:	11 bar (g), 230°C for 1000 - 2750 10 bar (g), 200°C for 3500 - 13600
Design, manufacturing and testing:	acc. to AD 2000
Approval:	acc. to PED 2014 / 68/ EU
Gas distributor:	Stainless steel
<b>Piping</b>	
Nominal pressure:	PN 16
Material:	Carbon steel
Design, manufacturing and testing:	acc. to AD 2000
Approval:	acc. to PED 2014 / 68 / EU

## PRODUCT SPECIFICATIONS

Standard conditions		
Pressure dewpoint:	-40°C (-70°C)	Selection at different operating conditions by correction factor f according to table "sizing"
Operating pressure:	7 bar (g)	
Inlet temperature:	+35°C (+25°C)	
Inlet humidity:	saturated	
Operating limits		
Media:	Compressed air/ Nitrogen	Design for operating conditions beyond specified application limits on request
Operating pressure:	4 - 10 bar (g)	
Inlet temperature:	5 - 40°C (5 - 30°C)	
Ambient temperature:	5 - 40°C	
Max. blower inlet:	35°C/ 85% r. h. to 40°C/ 70% r. h.	
Installation:	indoor	
Controller (standard version)		
Design:	acc. to VDE/ IEC	Special versions on request
Power supply:	3 Phases / 400V - 50 Hz	
Control voltage:	24 VDC / 230 VAC - 50 Hz	
PLC:	Siemens S7-1200 with CPU 1214C	
Text display:	Siemens KTP 600	
Protection class:	IP 54, acc. to IEC 529	
Control box:	C-steel sheet, powder coated, RAL 7035	
Potential free common alarm contact:	incl.	
Main switch:	incl.	

## SIZING

Type	Pressure Dewpoint (PDP)	Inlet temperature	Operating pressure (bar)						
			4	5	6	7	8	9	10
HRS-L	-40°C	30°C	0,72	0,92	1,09	1,25	1,36	1,45	1,51
		35°C	0,55	0,70	0,86	1,00	1,12	1,25	1,37
		40°C	0,33	0,45	0,58	0,71	0,82	0,92	1,03
	-70°C	20°C	0,79	0,92	1,02	1,14	1,22	1,34	1,45
		25°C	---	0,88	0,97	1,10	1,18	1,30	1,42
		30°C	---	---	0,86	1,00	1,12	1,25	1,35
			Correction factors (f)						

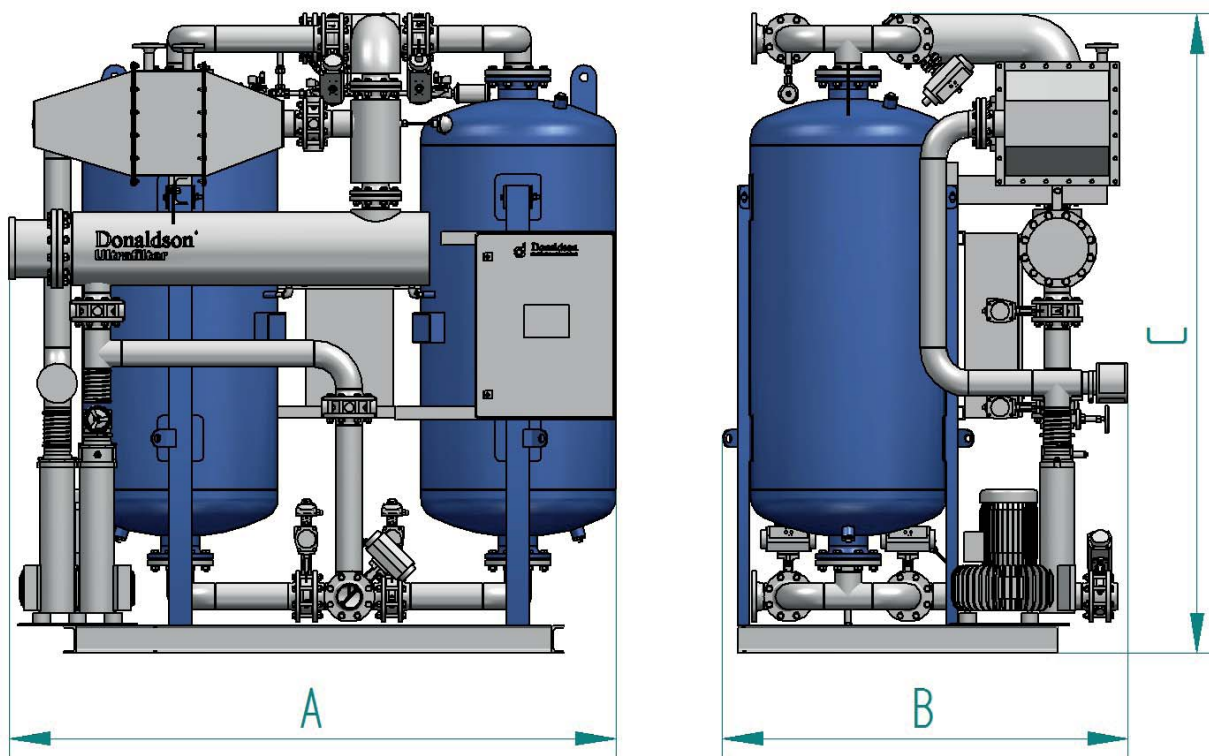
### Example:

$\dot{V}_{nom} = 3990 \text{ m}^3/\text{h}$ , inlet temperature = 40°C, operating pressure = 6 bar (g), PDP = -40°C

$$\dot{V}_{korr} = \frac{\dot{V}_{nom}}{f} = \frac{3990 \text{ m}^3/\text{h}}{0,58} = 6879 \text{ m}^3/\text{h}$$

**Calculated dryer size:  
Type HRS-L 7000**

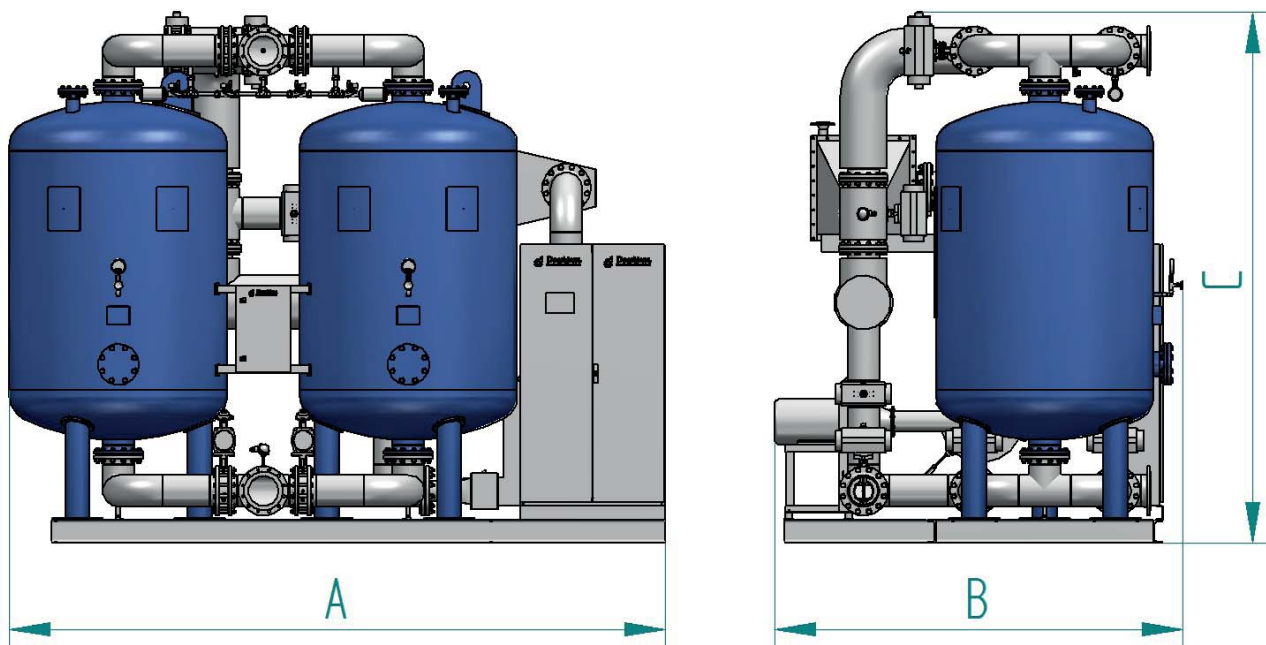
DIMENSIONS



Type	$\dot{V}_{nom}$ at 7 bar (g)		Connections PN 16, DIN EN 1092	Installed Power kW	Dimensions			Weight kg
	m <sup>3</sup> /h	cfm			A mm	B mm	C mm	
1000	1000	590	DN 80	18,2	2080	1290	2460	1640
1350	1350	800	DN 80	24,0	2150	1450	2580	1850
1650	1650	975	DN 80	28,0	2240	1510	2630	2130
1950	1950	1150	DN 100	32,5	2310	1630	2720	2570
2250	2250	1330	DN 100	38,0	2380	1680	2740	2720
2750	2750	1620	DN 100	42,5	2640	1770	2790	3200

$\dot{V}_{nom}$  in m<sup>3</sup>/h related to compressor inlet at 20°C and 1 bar (a), an operating pressure of 7 bar (g) and a compressed air inlet temperature of +35°C (saturated).

DIMENSIONS



Type	$\dot{V}_{nom}$ at 7 bar (g)		Connections PN 16, DIN EN 1092	Installed Power kW	Dimensions			Weight kg
	m <sup>3</sup> /h	cfm			A mm	B mm	C mm	
<b>3500</b>	3500	2065	DN 100	52,5	3620	1990	3000	3990
<b>4000</b>	4000	2360	DN 150	67,5	3660	2020	3210	4850
<b>5000</b>	5000	2945	DN 150	71,0	3880	2290	3310	5990
<b>6000</b>	6000	3535	DN 150	86,0	4020	2390	3190	6900
<b>7000</b>	7000	4125	DN 150	95,0	4220	2490	3250	7480
<b>8750</b>	8750	5155	DN 200	115,0	4520	2820	3660	10050
<b>10500</b>	10500	6185	DN 200	135,0	5400	2870	3390	13650
<b>11500</b>	11500	6770	DN 200	153,0	5600	2980	3450	14700
<b>13600</b>	13600	8010	DN 200	178,5	6000	3190	3390	16500

$\dot{V}_{nom}$  in m<sup>3</sup>/h related to compressor inlet at 20°C and 1 bar (a), an operating pressure of 7 bar (g) and a compressed air inlet temperature of +35°C (saturated).