Dryer Systems

Heatless Regenerating Adsorption Dryers

Ultrapac® HED-ALD-MSD 1350 - 8750

MAIN FEATURES & BENEFITS

- Purification package complete with pre- and afterfilter
- Prefilter with electronic, level-controlled condensate drain
- Generous dimensioned filters:
  large filtration surface, therefore low pressure drop and low operating costs
- Easy servicable butterfly valves
- Comprehensive option package:
  Dewpoint depending control, start-up device, bypass, pneumatic control, free of silicone and extractable components, etc.
- 11 sizes available, matched to the compressor flows, with 3 selectable pressure dewpoints each

HED-ALD-MSD
1350 - 8750

INDUSTRIES

- Chemical and electrical industry

- Machine building industry and plant engineering / construction

- Automotive industry

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HED-ALD-MSD 1350 - 8750

PRODUCT DESCRIPTION

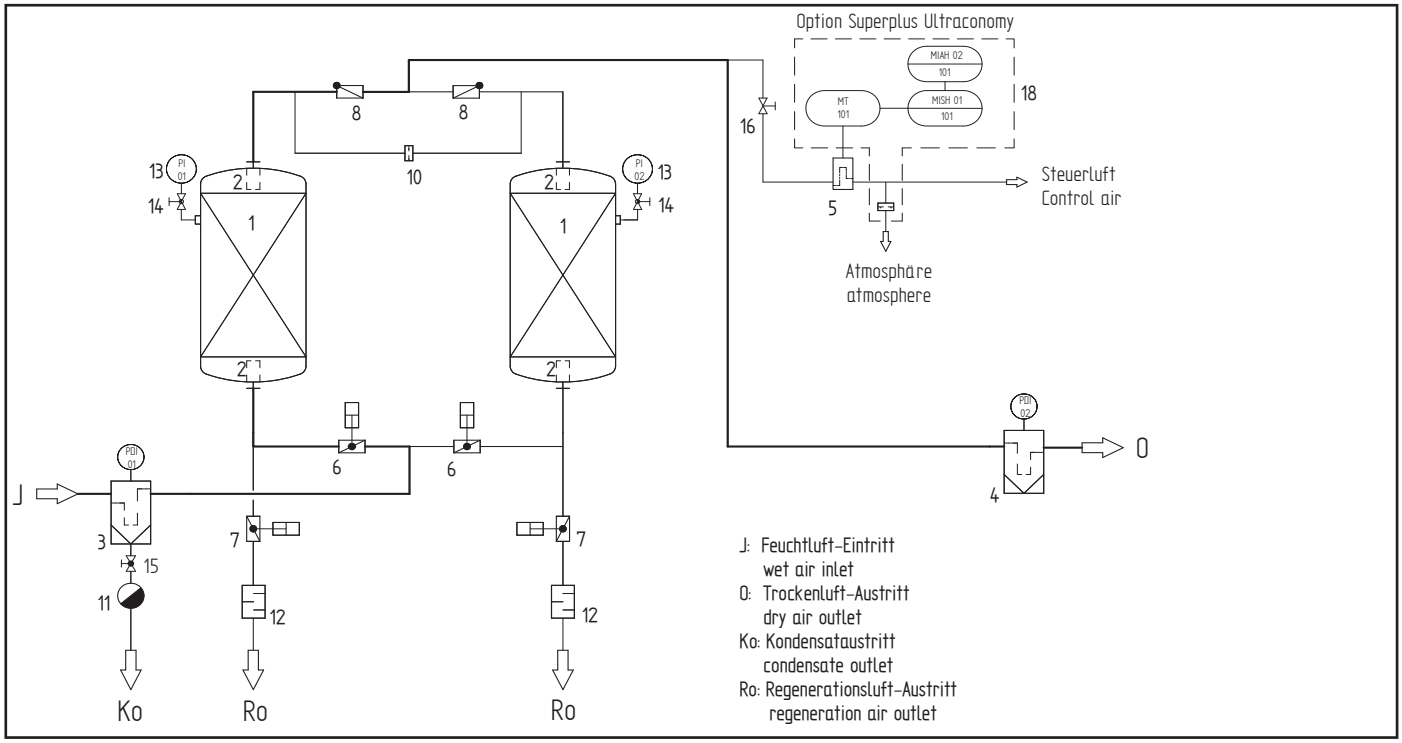
Compressed air is lead through the inlet of the dryer (J) via the prefilter (3). At this stage, the air is cleaned from particles and condensate. The condensate are removed by a condensate drain (11). Via a butterfly valve (6), the air is lead into the adsorption vessel (1), in which the air is dried down to the required dewpoint. After that, the air is lead through a non-returnvalve (8) and an afterfilter (4), in which possibly released particles from the desiccant are retained. Via the dryer outlet (O), the clean and dry air is let into the compressed air network to the point of use.

While one vessel is in the drying phase (adsorption), the other vessel is being dried again (regeneration). A partial stream of dried air is expanded to atmospheric pressure via an nozzle (10) and lead across the desiccant bed for regeneration and via a butterfly valve (7) and a silencer (12) to the atmosphere

Typical applications for the adsorption dryers HED-ALD-MSD are:

- **Central air treatment:**
  Production of dry, oil-free and particulate-free compressed air

- **Back up system:**
  for heat regenerated adsorption dryers



HED-ALD-MSD 1350 - 8750

PRODUCT SPECIFICATIONS

Features:	Benefits:
Purification package complete with pre- and afterfilter	Turnkey system, no additional installation required, all components from one hand, technically perfectly matched to each other
Prefilter with electronic, level-controlled condensate drain incl. function control and alarm message	No compressor air losses due to condensate removal, therefore reduction of operating costs
Easy serviceable butterfly valves	Short service downtime
Generous dimensioned filters and vessel diameters	Large filtration surface, therefore low flow speed, low pressure drop and low operating costs
Display of operating status by LED	High operating safety, since all operating status can be detected easily at any time
Intermittent operation standard	Link between dryer and compressor possible on central applications, therefore saving of compressed air
11 sizes available, matched to the compressor flows, with 3 selectable pressure dewpoints each	Custom made solutions possible, matching exactly customer's requirements; no oversizing of compressors neccessary, due to lowest possible regeneration air requirements
Comprehensive option package: Dewpoint depending control, start-up device, bypass, pneumatics control, change-over control etc.	Flexibility in application, well thought option package for economical operation and safe system installation in the compressed air network
Superplus Version including dewpoint dependent capacity control and text display	Saving of energy and operational cost due to adaption of the purge air consumption to the actual operating conditions. Indication of current dewpoint and function status as well as alarm and service messages on LCD text display in clear text ensures high operating safety of the adsorption dryer.

Technical Data	
Operating pressure:	min. 4 bar (ü) / max. 10 bar (ü)
Ambient temperature:	min. +4°C / max. +50°C
Medium temperature:	min. +5°C max. +50°C
Medium:	Druckluft / Stickstoff
Power supply:	230 VAC / 50-60 Hz or 110 VAC / 50-60 Hz or 24 VDC
Power consumption	40 W
Declaration of Conformity	
Types 1350 - 8750:	acc. to PED 97/23/EC
Pressure vessel – design, manufacture, testing	
Adsorber:	acc. to PED 97/23/EC
Filter:	acc. to PED 97/23/EC

HED-ALD-MSD 1350 - 8750

PRODUCT SPECIFICATIONS

HED/ ALD/ MSD	Volume flow in m³/h (1 bar, 20°C)*	Regeneration air losses average m³/h (1 bar, 20°C)			Volume flow out (min.) m³/h (1 bar, 20°C)			Pressure loss initial mbar	Prefilter (Afterfilter) M (PE)
		HED	ALD	MSD	HED	ALD	MSD		
1350	1350	189	202,5	270	1102,77	1093,93	1013	190	30/30
1650	1650	231	247,5	330	1347,71	1336,93	1238	230	30/30
1950	1950	273	292,5	390	1592,65	1579,91	1463	160	30/50
2250	2250	315	337,5	450	1837,59	1822,89	1688	180	30/50
2750	2750	385	412,5	550	2245,83	2227,86	2063	240	30/50
3500	3500	490	525	700	2857,63	2834,77	2625	280	3-20/30
4000	4000	560	600	800	3265,84	3239,74	3000	140	4-30/30
5000	5000	700	750	1000	4082,33	4049,68	3750	170	4-30/30
6000	6000	840	900	1200	4898,8	4859,61	4500	220	4-30/30
7000	7000	980	1050	1400	5715,27	5669,55	5250	260	4-30/30
8750	8750	1225	1312,5	1750	7144,63	7087,47	6563	160	8-30/30

* related to 1 bar (abs) and 20 °C at intake of compressor and 7 bar (g) and 35 °C inlet temperature

SIZING

Type	Pressure dewpoint (PDP)	Residual water content	Inlet temperature	Operating pressure (bar)												
				4	5	6	7	8	9	10	11	12	13	14	15	16
HED ALD	-20°C -40°C	0,88 g/m³ 0,11 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
MSD	-40°C	0,11 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
	≤ -40°C* ↑ DTP ↓ ≥ -70°C*	0,11 g/m³	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
		0,0027 g/m³	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:

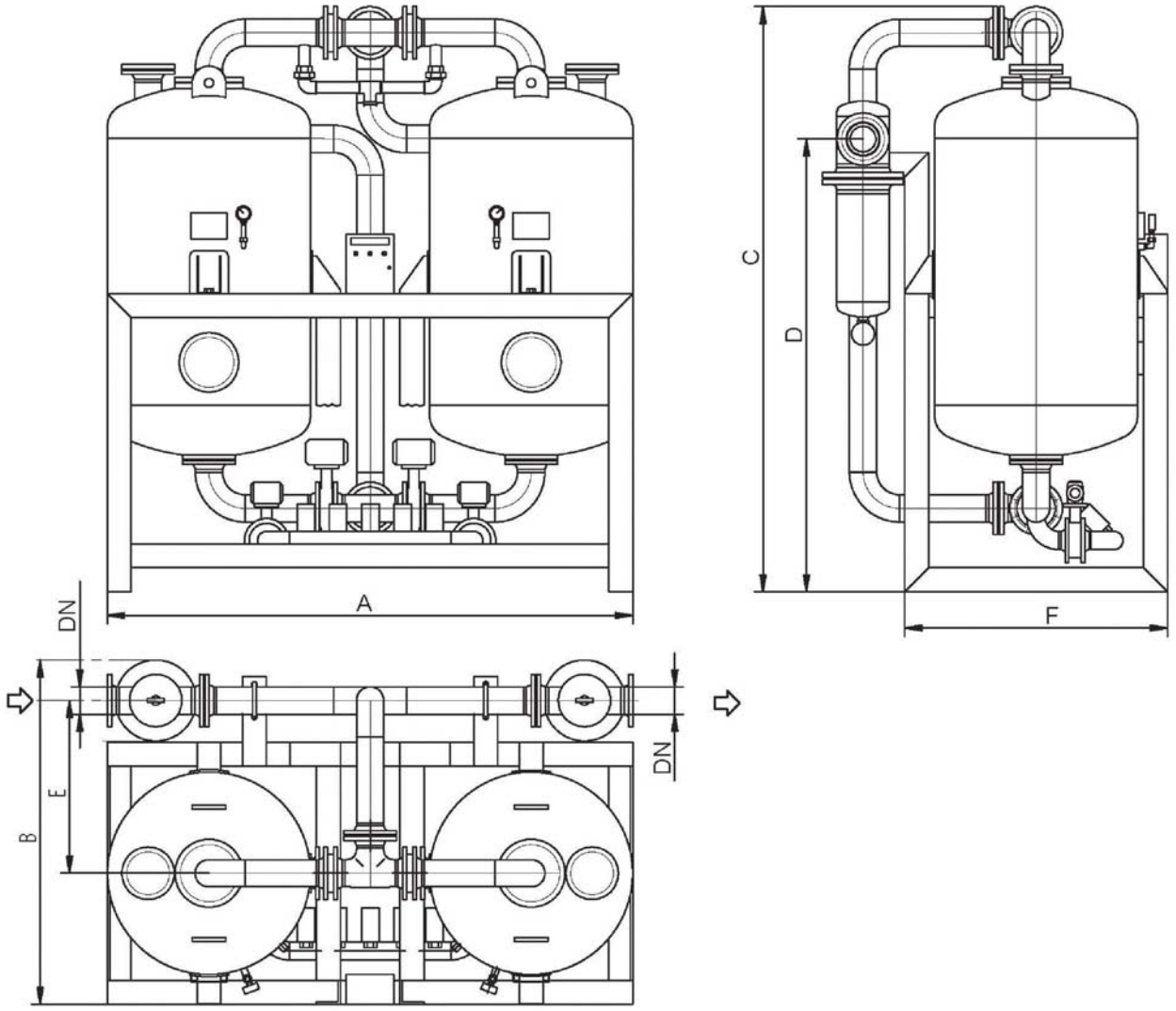
$\dot{V}_{nom}$ = 2500 m³/h, inlet temperature = 30°C, operating pressure = 10 bar (g), PDP = -40°C

$$\dot{V}_{korr} = \frac{\dot{V}_{nom}}{f} = \frac{2500\ m^3/h}{1,51} = 1655,6\ m^3/h$$

Calculated dryer size:
ALD, Typ 1950

HED-ALD-MSD 1350 - 8750

DIMENSIONS



Type	DN mm	A mm	B mm	C mm	D mm	E mm	F mm	Weight kg
1350	80	1500	950	2555	1800	475	700	1230
1650	80	1700	1050	2365	1800	525	800	1400
1950	100	1800	1190	2485	1900	595	850	1660
2250	100	1900	1290	2605	1900	645	950	1890
2750	100	2000	1340	2695	1900	670	1000	2070
3500	100	2200	1490	2695	1900	745	1150	2970
4000	150	2400	1600	2980	2250	825	1200	3750
5000	150	2600	1680	3040	2250	860	1300	4000
6000	150	2800	1780	3080	2250	910	1400	4900
7000	150	3000	1880	3095	2250	960	1500	5820
8750	200	3400	2290	3320	2300	1150	1700	7660

Dryer Systems

Heat Regenerating Adsorption Dryers

Ultradryer HRE 0375 - 13600

MAIN FEATURES & BENEFITS

- 19 sizes available, matching to the compressor flow capacities
- Energy-efficient regeneration (desorption) in counter-current flow
- Applicable in all climate zones due to cooling by partial current flow of the dry air
- Pressure dewpoint of -40°C as standard, individual cases down to -70°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

HRE 2750

INDUSTRIES

- Chemical and electrical industry

- Machine building industry and plant engineering / construction

- Automotive industry

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PRODUCT DESCRIPTION

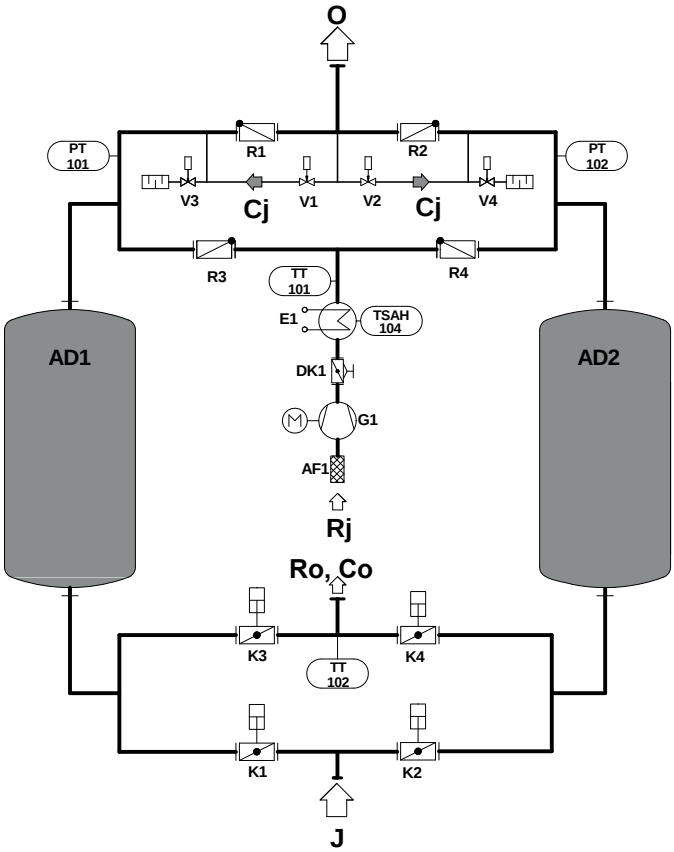
The externally heat regenerated adsorption dryers HRE 0375-13600 work according to the dynamic adsorption principle. Wet compressed air streams through a desiccant bed. While streaming through, moisture is drawn out of the compressed air. Since the adsorption capacity of the desiccant is limited, the flow direction has to be changed before the desiccant is completey 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 re-spectively 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 a partial stream of dried compressed air

Typical applications for the adsorption dryers HRE 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

PRODUCT SPECIFICATIONS

Features:	Benefits:
19 sizes available, matched to the compressor flow capacities	Custom made solutions possible, matching exactly customer's requirements; no oversizing of compressors necessary, due to lowest possible regeneration air requirements
Energy-efficient regeneration (desorption) in counter-current flow	Low desorption temperature, less energy consumption
Cooling of the heated desiccant by small partial current flow of the dry air	Independently of ambient temperature and humidity, applicable in tropical environment, 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	
Adsorption vessel	
Material:	Carbon steel
Design data:	11 bar (g), 230°C for 0375 - 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
Piping	
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	Selection at different operating conditions by correction factor f according to table “sizing”
Operating pressure:	7 bar (g)	
Inlet temperature:	+35°C	
Inlet humidity:	saturated	
Average cooling air consumtion:	ca. 2% related to $\dot{V}_{nom}$	
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	
Ambient temperature:	5 - 40°C	
Max. blower inlet:	35°C/ 45% r.h. to 30°C/ 60% 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
HRE	-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
			Correction factors (f)						

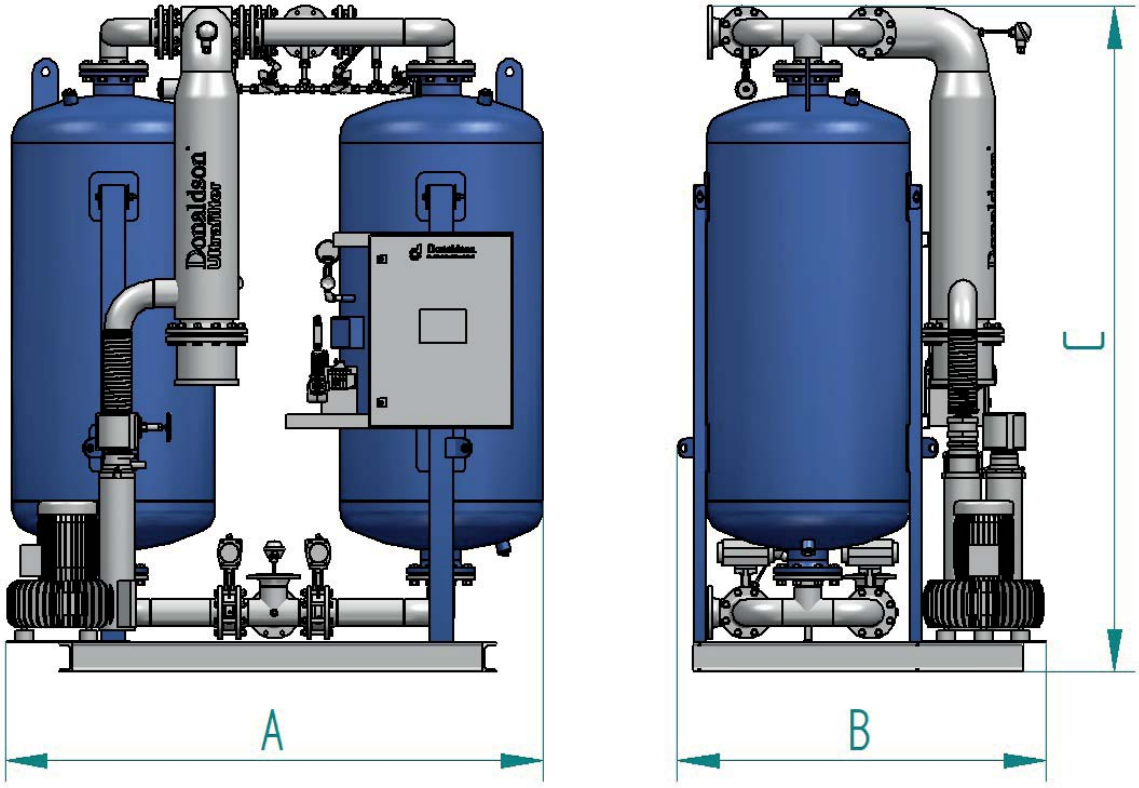
Example:

$\dot{V}_{nom}$ = 3990 m³/h, inlet temperature = 40°C, operating pressure = 6 bar (g), PDP = -40°C

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

Calculated dryer size:
Type HRE 7000

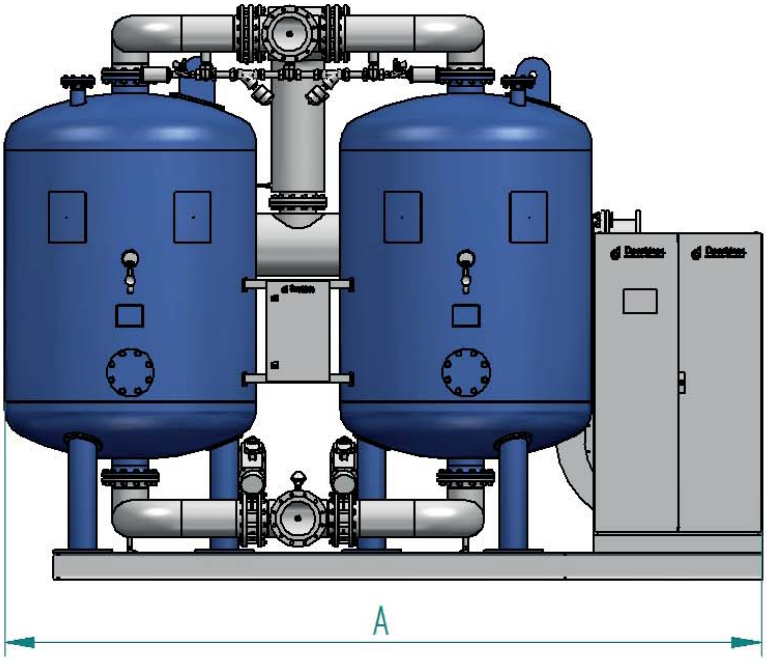
DIMENSIONS

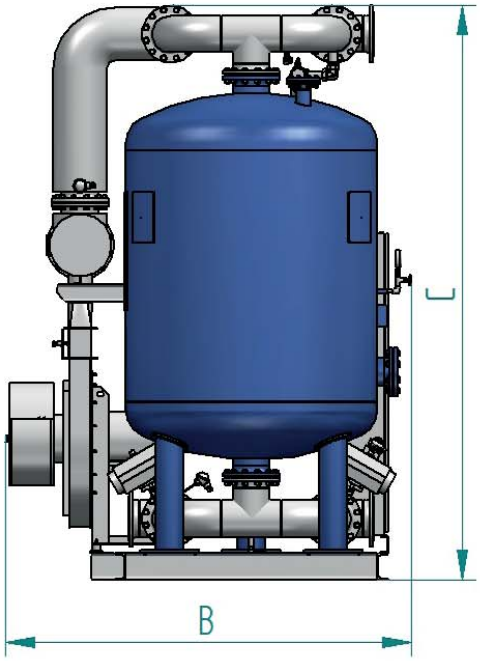


Type	$\dot{V}_{nom}$ at 7 bar (g)		Connections	Installed Power	Dimensions			Weight
	m³/h	cfm	PN 16, DIN EN 1092	kW	A mm	B mm	C mm	kg
0375	375	220	DN 50	7,6	1460	990	2140	760
0550	550	325	DN 50	11,2	1520	1120	2340	920
0650	650	385	DN 50	11,2	1540	1140	2260	1100
0850	850	500	DN 50	14,2	1580	1210	2330	1210
1000	1000	590	DN 80	14,2	1640	1170	2460	1400
1350	1350	800	DN 80	20,0	1830	1290	2580	1500
1650	1650	975	DN 80	24,0	1850	1410	2630	1830
1950	1950	1150	DN 100	32,5	2030	1450	2720	2130
2250	2250	1330	DN 100	32,5	2100	1480	2740	2280
2750	2750	1620	DN 100	38,0	2250	1550	2790	2680

$\dot{V}_{nom}$ in m³/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	Installed Power	Dimensions			Weight
	m³/h	cfm	PN 16, DIN EN 1092	kW	A mm	B mm	C mm	kg
3500	3500	2065	DN 100	44,5	3350	1800	2860	3350
4000	4000	2360	DN 150	52,5	3450	1820	2980	3990
5000	5000	2945	DN 150	71,0	3770	1920	3110	5000
6000	6000	3535	DN 150	86,0	3910	2070	3210	6200
7000	7000	4125	DN 150	95,0	4100	2190	3270	6700
8750	8750	5155	DN 200	115,0	4520	2430	3420	8470
10500	10500	6185	DN 200	135,0	4780	2600	3310	11200
11500	11500	6770	DN 200	153,0	4970	2750	3350	12000
13600	13600	8010	DN 200	177,5	5280	2980	3380	14000

$\dot{V}_{nom}$ in m³/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).

Dryer Systems

Heat Regenerating Adsorption Dryers

Ultradryer HRG+ 0450 - 16000

MAIN FEATURES & BENEFITS

- 19 sizes available, matching to the compressor flow capacities
- Regeneration (desorption) with ambient air
- Cooling with ambient air (zero purge)
- Pressure dewpoint of -40°C as standard
- 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 until 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

HRG+ 2750

INDUSTRIES

- Chemical and electrical industry

- Machine building industry and plant engineering / construction

- Automotive industry

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Donaldson® Ultrafilter

PRODUCT DESCRIPTION

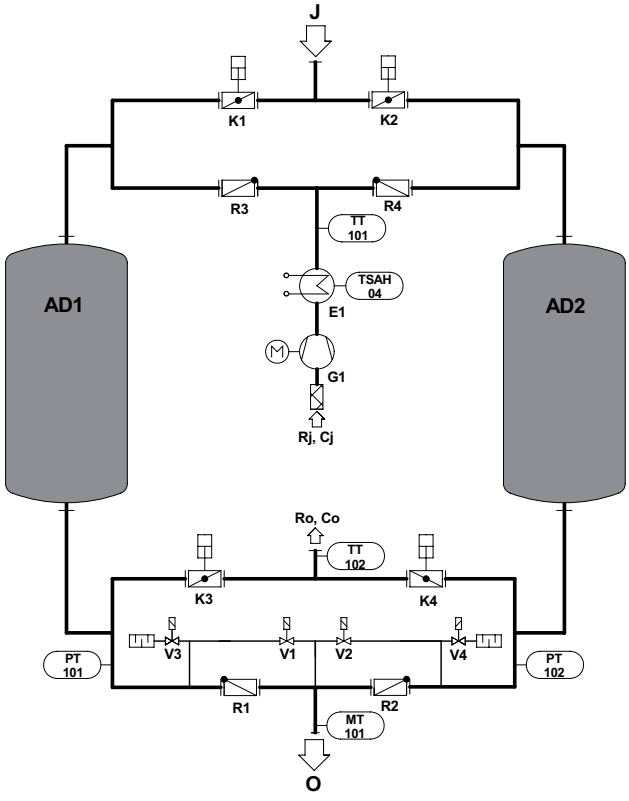
The externally heat regenerated adsorption dryers HRG+ 0450-16000 work according to the dynamic adsorption principle. Wet compressed air streams through a desiccant bed. While streaming through, moisture is drawn out of the compressed air. Since the adsorption capacity of the desiccant is limited, the flow direction has to be changed before the desiccant is completey 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 co-current flow to the adsorption direction with externally heated blower air.
2. Cooling of the heated desiccant with ambient air

Typical applications for the adsorption dryers HRG+ 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

PRODUCT SPECIFICATIONS

Features:	Benefits:
19 sizes available, matched to the compressor flows	Custom made solutions possible, matching exactly customer's requirements; no oversizing of compressors necessary, due to no regeneration air requirements
Regeneration (desorption) with ambient air	No compressed air consumption
Cooling of the heated dessicant with ambient air	No compressed air consumption (zero purge)
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 a 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 release agent, 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	
Adsorption vessel	
Material:	Carbon steel
Design data:	11 bar (g), 230°C for 0450 - 3300 10 bar (g), 200°C for 4150 - 16000
Design, manufacturing and testing:	acc. to AD 2000
Approval:	acc. to PED 97/ 23/ EC
Gas distributor:	Stainless steel
Piping	
Nominal pressure:	PN 16
Material:	Carbon steel
Design, manufacturing and testing:	acc. to AD 2000
Approval:	acc. to PED 97/ 23/ EC

PRODUCT SPECIFICATIONS

Standard conditions		
Pressure dewpoint:	-40°C	Selection at different operating conditions by correction factor f according to table “sizing”
Operating pressure:	7 bar (g)	
Inlet temperature:	+35°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	
Ambient temperature:	5 - 40°C	
Max. blower inlet:	35°C/ 45% to 30°C/ 60% 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
HRG+	-40°C	30°C	0,74	0,96	1,16	1,32	1,37	1,49	1,61
		35°C	0,51	0,68	0,86	1,00	1,14	1,30	1,47
		40°C	0,28	0,42	0,54	0,68	0,85	0,96	1,11
			Correction factors (f)						

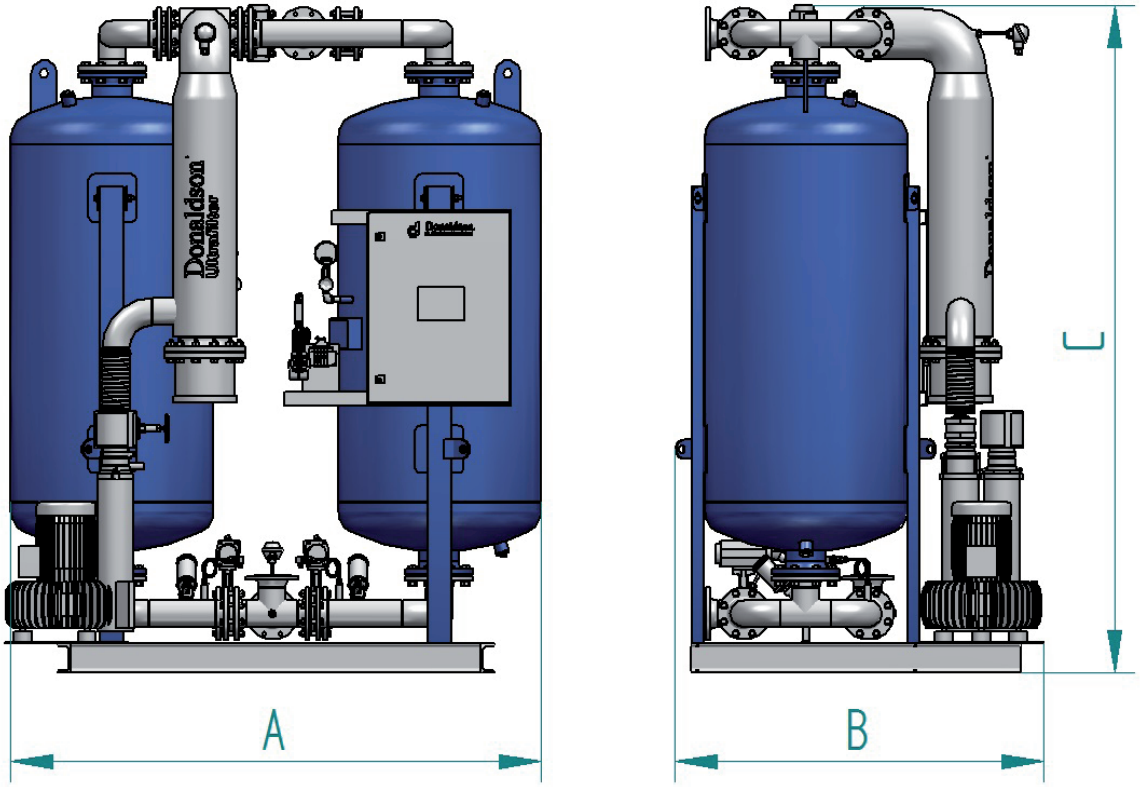
Example:

$\dot{V}_{nom}$ = 3850 m³/h, inlet temperature = 40°C, operating pressure = 6 bar (g), PDP = -40°C

$$\dot{V}_{korr} = \frac{\dot{V}_{nom}}{f} = \frac{3850\ m^3/h}{0{,}54} = 7130\ m^3/h$$

Calculated dryer size:
Type HRG+ 7200

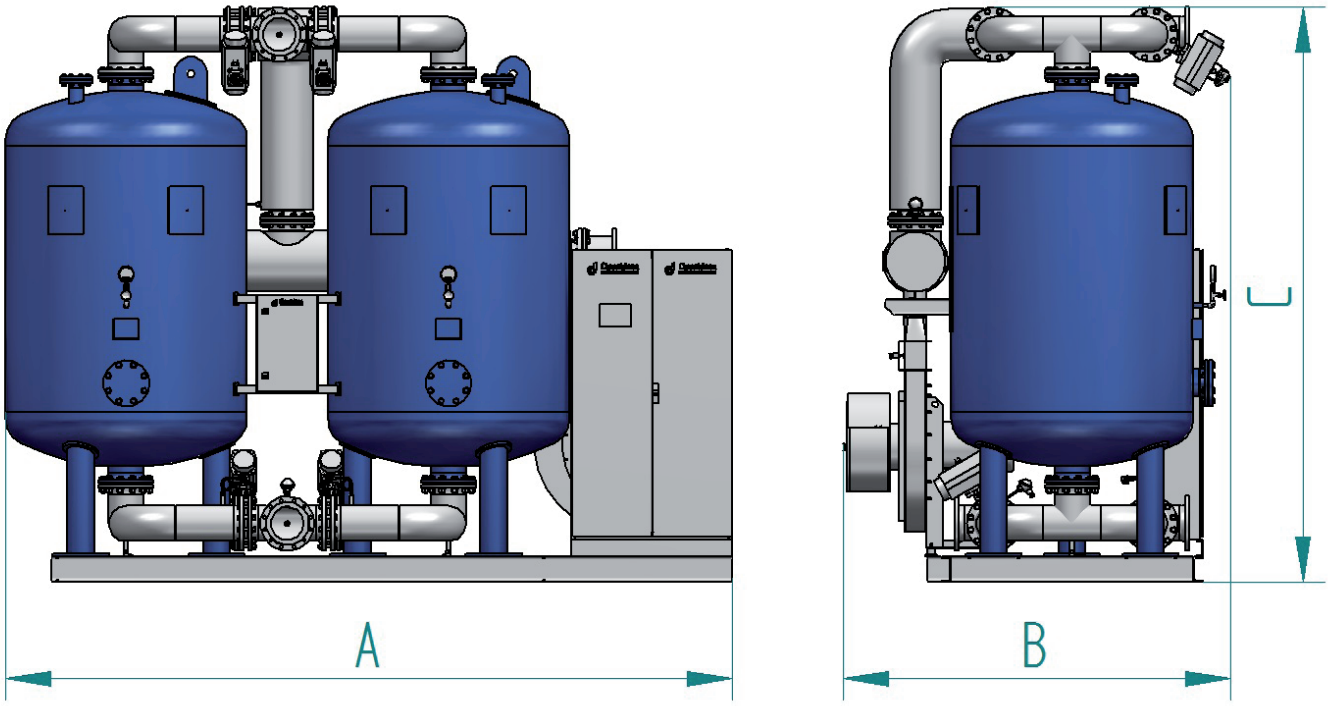
DIMENSIONS



Type	$\dot{V}_{nom}$ at 7 bar (g)		Connections	Installed Power	Dimensions			Weight
	m³/h	cfm	PN 16, DIN EN 1092	kW	A mm	B mm	C mm	kg
0450	**450**	265	DN 50	10,6	1470	990	2170	790
0660	**660**	390	DN 50	11,2	1520	1160	2350	960
0770	**770**	455	DN 50	11,2	1540	1150	2310	1120
1000	**1000**	590	DN 50	14,2	1580	1210	2370	1290
1200	**1200**	710	DN 80	18,2	1630	1170	2470	1480
1600	**1600**	945	DN 80	24,0	1830	1290	2590	1580
1950	**1950**	1150	DN 80	28,0	1850	1360	2670	1870
2300	**2300**	1355	DN 100	38,0	2030	1450	2730	2280
2650	**2650**	1560	DN 100	38,0	2100	1480	2750	2460
3300	**3300**	1945	DN 100	42,5	2250	1550	2800	2900

$\dot{V}_{nom}$ in m³/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	Installed Power	Dimensions			Weight
	m³/h	cfm	PN 16, DIN EN 1092	kW	A mm	B mm	C mm	kg
4150	**4150**	2445	DN 100	52,5	3350	1800	3060	3650
4750	**4750**	2800	DN 150	67,5	3500	1930	3180	4300
6000	**6000**	3535	DN 150	86,0	3760	1990	3310	5230
7200	**7200**	4240	DN 150	86,0	3910	2240	3460	6470
8300	**8300**	4885	DN 150	111,0	4090	2340	3520	6950
10500	**10500**	6180	DN 200	135,0	4520	2410	3570	9170
12500	**12500**	7360	DN 200	153,0	4780	2600	3510	12000
13600	**13600**	8010	DN 200	174,0	4970	2750	3600	13000
16000	**16000**	9420	DN 200	198,5	5280	2980	3530	15000

$\dot{V}_{nom}$ in m³/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).

Ultrapac 2000 Standard, Ultrapac 2000 Superplus, Midi (Type 0035 to 0100)

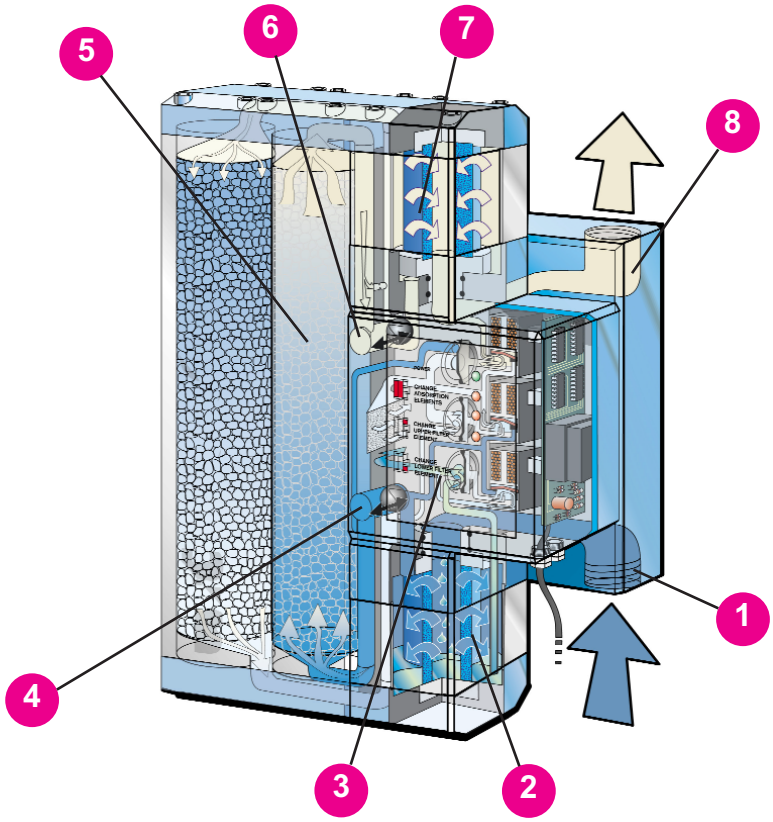
Complete purification package with heatless adsorption dryer, pre-, afterfilter and condensate drain.

Ultrapac 2000 Standard

Compressed air is led through the inlet of the dryer (1) and across the prefilter (2).
At this stage, the air is cleaned from particles and condensate.
The condensate is removed via the membrane condensate drain (3).
Via the lower shuttle valve (4), the air is led into desiccant cartridges (5), in which the air is dried down to the required dewpoint.
Via the upper shuttle valve (6), the air gets into an afterfilter (7), in which particles from the desiccant are retained.
Via the outlet (8), the clean and dry air is lead into the compressed air network to the point of use.
While one vessel with desiccant cartridge is in the drying phase (adsorption), the other cartridge is being dried again (regeneration).
A partial stream of dried air is expanded via an orifice and lead accross the desiccant cartridge for regeneration and via a solenoid valve and a silencer system to the atmosphere.

Ultrapac 2000	Volume flow in m^3/h (1 bar, 20°C)*	Regeneration air losses (average) m^3/h (1 bar, 20°C)	Volume flow out (min.) m^3/h (1 bar, 20°C)	Pressure loss initial mbar	Prefilter MF	Afterfilter PE	Quantity of cartridges
0035	35	5.95	27.65	75	04/20	04/20	4
0050	50	8.50	39.50	100	05/20	05/20	6
0065	65	11.05	51.35	125	05/25	05/25	8
0080	80	13.60	63.20	170	07/25	07/25	10
0100	100	17.00	79.00	250	07/25	07/25	12

* Related to 1 bar (abs) and 20 °C at intake of compressor and 7 bar (g) and 35 °C inlet temperature



Technical alterations reserved (R02/ 2005/11/30)

Technical Data

Donaldson Ultrafilter®

Ultrapac 2000 Standard Midi
Ultrapac 2000 Superplus Midi

Features Ultrapac 2000 series:	Benefits:
Purification package complete with pre-, afterfilter and condensate drain.	Turnkey System, no additional installation cost; all components from one hand, therefore perfect technical match
Desiccant in cartridges	Easy storage, transport and Installation; optimum fixation of desiccant; no risk of fluidizing of desiccant
Compact, space saving design	Installation in smallest spaces, possible also as retrofit
Component exchange display	High operating safety, due to calculation of optimum exchange point for filter elements and desiccant cartridges.
Unique Multifunction Block	All moving parts and all electronic components integrated in a function block, therefore easy and efficient maintenance

Features Ultrapac 2000 Superplus:	Benefits:
Intermittent operation standard	Link between dryer and compressor possible on central applications, therefore saving of regeneration air
Throttle package	By means of enclosed throttle package and automatic adaptation of the control at inputted operating conditions, an optimal regeneration air consumption and a maximally possible flow according to the correction factor table within the total range of 4-16 bar (g) and 25-50°C is reached
Load control	Adjustment of adsorption cycles to the actual inlet water load, therefore saving of regeneration air and reduction of operating cost
Self-Diagnosis-System	Sensor-controlled monitoring of regeneration air flow, therefore without-gap-monitoring of dryer functions and of system pressure
Text Display	Display of all operating status, of fault indication and maintenance intervals in clear text messages
Info-Channel	Serial interface for transmission of alarm- and maintenance messages
Economizer-Function	Online calculation of optimum exchange point of filter elements by continuous evaluation of energy cost versus cost of replacement filter element

Sizing:

f	4 bar(g)	5 bar(g)	6 bar(g)	7 bar(g)	8 bar(g)	9 bar(g)	10 bar(g)	11 bar(g)	12 bar(g)	13 bar(g)	14 bar(g)	15 bar(g)	16 bar(g)
25°C	0.69	0.82	0.96	1.10	1.24	1.38	1.50	1.50	1.50	1.50	1.50	1.50	1.50
30°C	0.69	0.82	0.96	1.10	1.24	1.38	1.50	1.50	1.50	1.50	1.50	1.50	1.50
35°C	0.63	0.75	0.88	1.00	1.13	1.26	1.38	1.50	1.50	1.50	1.50	1.50	1.50
40°C	0.48	0.58	0.68	0.77	0.87	0.96	1.06	1.16	1.25	1.35	1.45	1.50	1.50
45°C	0.38	0.45	0.53	0.60	0.68	0.75	0.83	0.90	0.98	1.05	1.13	1.20	1.28
50°C	0.30	0.36	0.42	0.48	0.54	0.60	0.66	0.72	0.78	0.84	0.90	0.96	1.02

$$\dot{V}_{corr} = \frac{\dot{V}_{nom}}{f}$$

Example: $\dot{V}_{nom}$ = 50 m³/h, Inlet temperature = 30°C, Operating pressure = 10 bar (g)

$$\dot{V}_{corr} = \frac{50\ m^3/h}{1.50} = 33{,}33\ m^3/h.$$

Calculated dryer size: Ultrapac 2000, Typ 0035

Product description:

Ultrapac 2000 Standard and Superplus:
Complete purification package, consisting of heatless adsorption dryer which works on the basis of pressure swing adsorption, with integrated pre- and afterfilter and electronic condensate drain

Medium:

Compressed air/ nitrogen

Pressure dewpoint

–40 °C at 100% load, –70 °C at 70% of rated flow and a maximum inlet temperature of 35 °C

Operation pressure:

min. 4 bar (g), max. 16 bar (g)

Medium temperature:

min. 5 °C, max. 50 °C

Ambient temperature:

min. 4 °C, max. 50 °C

Compressed air consumption:

17% of the rated flow, in average

Power supply:

230 V/50 -60 Hz AC;
110 V/50 -60 Hz AC
24 V DC; 24 V AC on request

Power consumption:

approx. 4 W

Materials:

Extruded Profiles	Anodized Aluminium
Adsorber and Filter lids	Glass fiber enforced polyamide

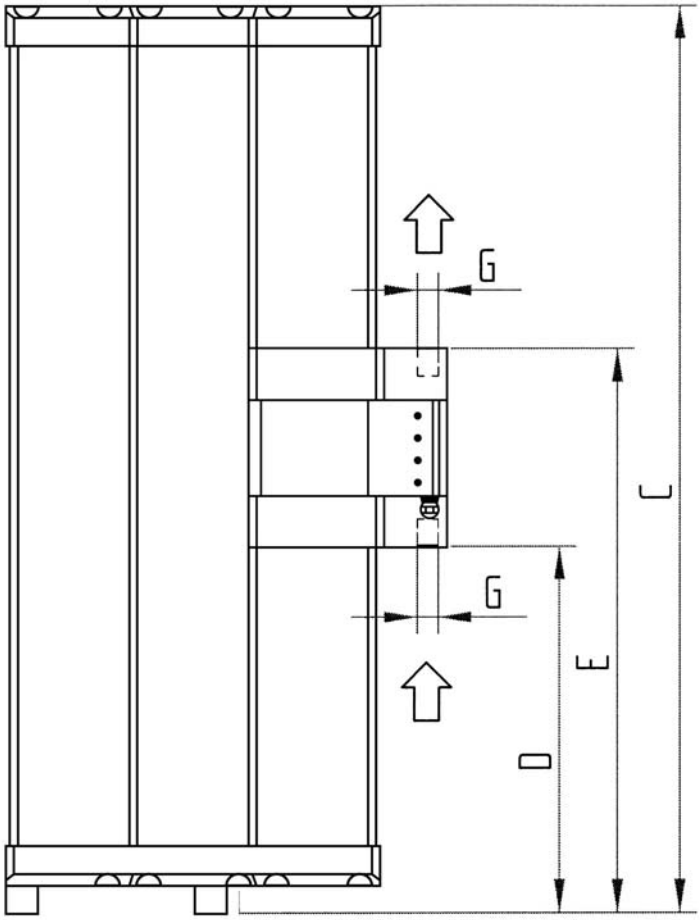
Declaration of conformity:

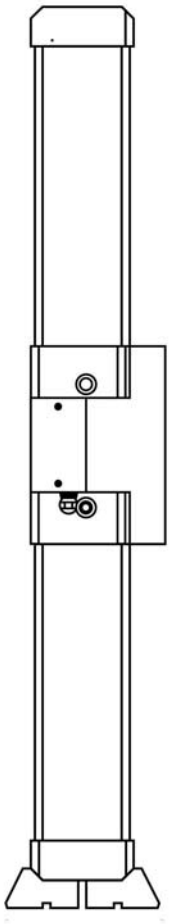
acc. to 73/23/EC
97/23/EC

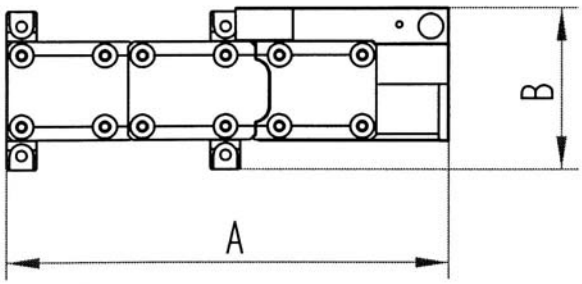
Dimension Sheet

Donaldson Ultrafilter

Ultrapac 2000 Standard Midi
Ultrapac 2000 Superplus Midi







Ultrapac 2000 Midi						
Type	**G** “	**A** mm	**B** mm	**C** mm	**D** mm	**E** mm
0035	G 1	531	195	665	227	465
0050	G 1	531	195	917	354	592
0065	G 1	531	195	1169	480	716
0080	G 1	531	195	1421	606	844
0100	G 1	531	195	1673	732	970

Donaldson®
Ultrafilter®

Ultrapac Classic Heatless Adsorption Dryers

Donaldson

Ultrapac Classic Heatless Adsorption Dryers

Trust Donaldson to deliver a complete range of compressed air purification solutions that improve air quality throughout your plant — from compressor room to all points of use. With over 30 years of expertise in compressed air filtration and separation, Donaldson manufactures a complete line of refrigeration, adsorption and membrane compressed air dryers to help produce clean, dry air and comply with air purification requirements.

Efficient, Compact Design Ultrapac Classic dryers provide high drying efficiency in a wide range of flow capacities. Available in two model series, the compact design and preinstalled prefilters and afterfilters allow quick and easy installation with a very small footprint. Delivering the highest quality air to your compressor lines, these dryers are engineered for easy maintenance, reduced installation costs, maximum efficiency and increased energy savings.

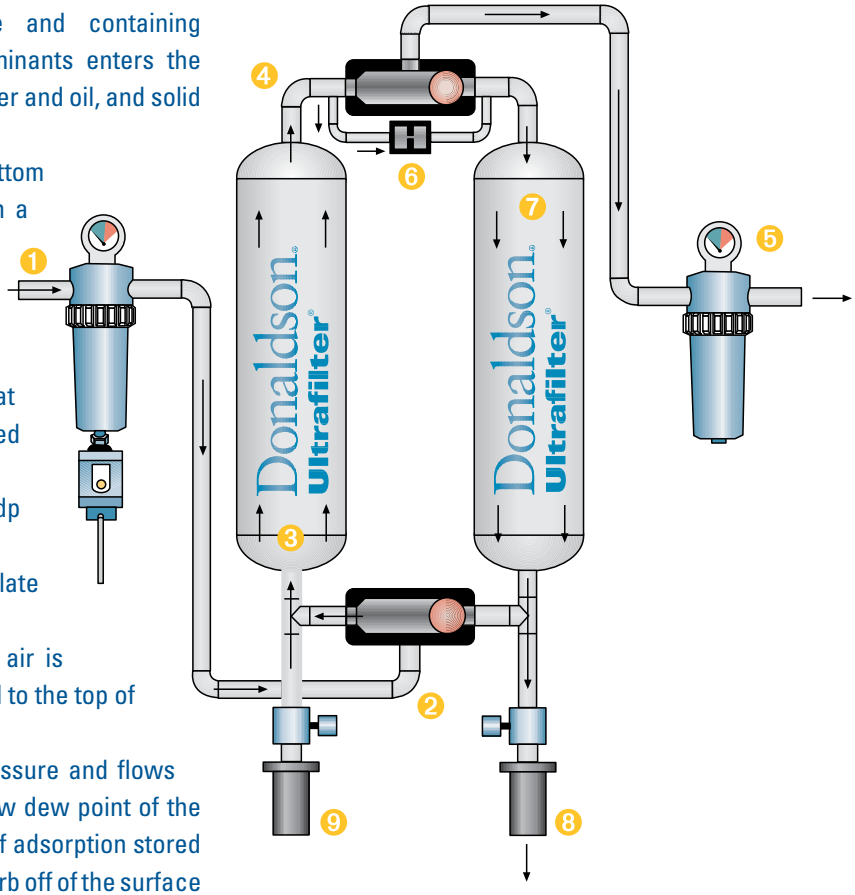
- **Guaranteed dew point performance (-20°C, -40°C or -70°C)**
- **Full enclosure for quiet, clean operation with easy-to-remove panels (0005 - 1000)**
- **Preinstalled prefilters and afterfilters reduce installation costs**
- **Coalescing prefilter with Ultramat zero-loss condensate drains**
- **Low pressure drop for increased energy savings**
- **Compact design – smallest footprint in the industry**
- **Ideally-located inlet and outlet connections**
- **Panel mounted controller, vessel pressure gauges and zero-loss drain control eases operation and system monitoring**
- **Energy-efficient flow direction from bottom to top of dessicant bed**

1. Adsorber
2. Pre filter
3. After filter
4. Automatic condensate drain UFM-T
5. Econometer differential pressure gauge
6. Shuttle valve
7. Solenoid valve with silencer
8. Panel-mounted controls and gauges

A. Protective attractive cabinet
B. Panel-mounted zero-loss drain control and test
C. Extremely small footprint
D. Guaranteed outlet dew point

Ultrapac Process Flow

1. Compressed air saturated with moisture and containing concentrated particulates and other contaminants enters the coalescing prefilter, which removes liquid water and oil, and solid particles.
2. Prefiltered compressed air then enters the bottom of the on-line drying vessel, passing through a simple, pressure controlled shuttle valve.
3. As the air flows upward through the bed, water vapor is removed from the air as water molecules adsorb on to the surface of the desiccant beads. Energy, called the heat of adsorption, is released and stored in the bed to be used for regeneration in a later step.
4. Dry compressed air at -20°C, -40°C or -0°C pdp exits the top of the on-line drying vessel.
5. The dried air then passes through a particulate afterfilter before entering the plant air system.
6. A small volume of dried compressed purge air is redirected from the outlet of the on-line vessel to the top of the off-line regenerating vessel.
7. The purge air is reduced to atmospheric pressure and flows downward through the off-line vessel. The low dew point of the expanded purge air, combined with the heat of adsorption stored in the bed, causes the water molecules to desorb off of the surface of the desiccant beads, regenerating the bed.
8. Wet purge air exits through the exhaust muffler.
9. At the end of the drying cycle, the on-line bed depressurizes downward through the exhaust muffler, and then goes off-line for regeneration.



Options

- Ultraconomy energy management system
- Pneumatic control
- Switch over control
- Dew point monitor and alarm
- Pressure controlled automatic start-up device
- Silicon-free components
- Bypass lines
- Safety relief valves

Adsorption drying - why?

- Only dry compressed air is also clean compressed air, because the moisture in the compressed air network conjoins dirt particles, which could lead to corrosion, production downtimes and losses in the production quality.

- Donaldson's high efficiency adsorption dryers remove moisture from the compressed air and therefore guarantee an efficient and secure production process. State-of-the-art technology and selected materials are the basis for high operational safety. The Ultrapac is equipped with the most modern control system, pre and after filter, condensate drain and silencer. Maximum efficiency and the highest operational safety, coupled with low operational costs are attributes that convey the advantages of the adsorption dryer. The areas of application are diverse and are matched to the exact requirements of the customer.

Ultraconomy Energy Management System

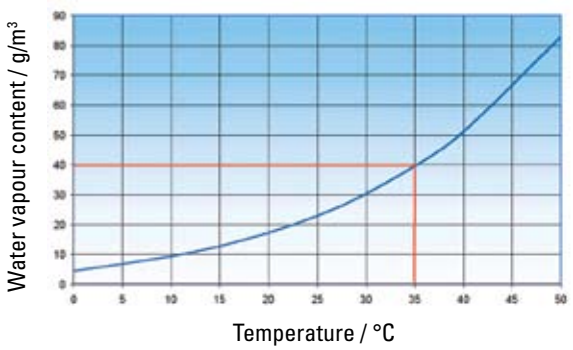
- The time-controlled adsorption dryer without capacity control operates with a predetermined cycle time for which the dryers is designed, irrespective whether the desiccant might be loaded to the maximum. The dryer's requirement for regeneration air (energy consumption of compressed air) therewith remains constant.

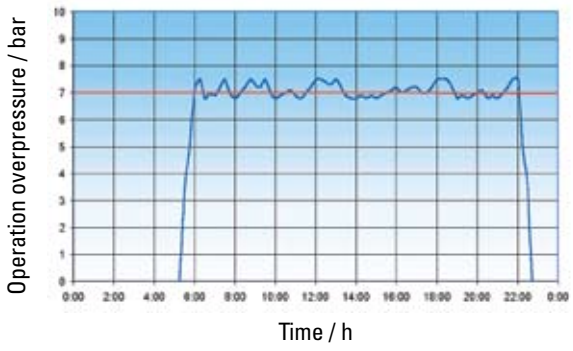
- The water load of the dryer depends on the actual operational conditions. If the inlet conditions, airflow, pressure or ambient temperatures vary, the quantity of the water loading will also vary.

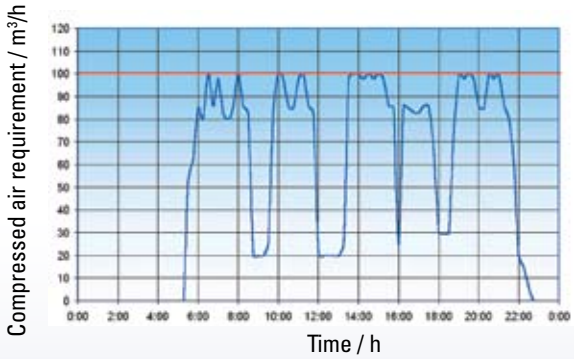
- With a continual dewpoint measurement at the outlet of the dryer, the newly developed "Ultraconomy" control will determine the actual amount of moisture that enters the dryer and will assess the optimum time when the dryer requires regenerating whilst maintaining a constant selected dew point.

- This leads to considerable savings in regeneration air. An example exemplifies this: a dryer designed for 100 m³/h, 35°C inlet temperature and 7 bar (g) operational pressure uses approx. 15m³/h regeneration air during a fixed cycle. At an average compressed air requirement of 60%, an average inlet temperature of 30°C and average pressure of 7.2 bar the water load only still amounts to approx. 45% of the original value. On average the dryer is now only using 6.75 m³/h and is therewith saving 8.25 m³ per hour. According to compressor type and condition this is equivalent to a power consumption of up to 1 kW.

- At a full cost price of 2 cents per m³ of generated compressed air and 8,000 operating hours per year the saving amounts to US$1.617.



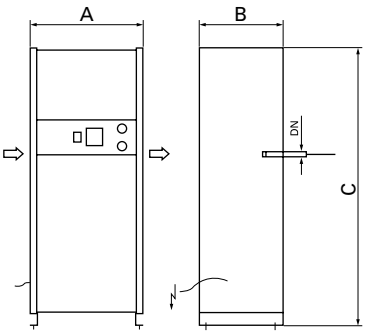




Donaldson

Technical Data Ultrapac Classic

Ultrapac HED/ALD/ MSD	Nominal inlet flow m^3/h (1 bar, 20°C)*	Average reg. air flow m^3/h (1 bar, 20°C)			Connection G (") DN (mm)	Dimensions		
		HED	ALD	MSD		Width (A) mm	Depth (B) mm	Height (C) mm
0005	5	0.7	0.8	1	G ⅜	470	340	700
0010	10	1.4	1.5	2	G ⅜	470	340	700
0015	15	2.1	2.3	3	G ⅜	470	340	1060
0025	25	3.5	3.8	5	G ½	470	340	1060
0035	35	4.9	5.3	7	G ½	470	340	1060
0050	50	7.0	7.5	10	G ½	670	450	1610
0080	80	11.2	12.0	16	G ¾	670	450	1610
0100	100	14.0	15.0	20	G 1	670	450	1610
0150	150	21.0	23.0	30	G 1	770	600	1980
0175	175	24.5	26.3	35	G 1	770	600	1980
0225	225	31.5	34.0	45	G 1½	770	600	1980
0300	300	42.0	45.0	60	G 1½	770	600	1980
0375	375	52.5	56.0	75	G 1½	950	700	2190
0550	550	77.0	83.0	110	G 2	950	700	2190
0650	650	91.0	98.0	130	G 2	950	700	2190
0850	850	119.0	128.0	170	G 2	1100	800	2350
1000	1000	140.0	150.0	200	G 2½	1100	800	2350
Type 0005 to 1000 in cabinet, including pre- and afterfilter								
1350	1350	189	202.5	270	DN 80	1500	950	2555
1650	1650	231	247.5	330	DN 80	1700	1050	2365
1950	1950	273	292.5	390	DN 100	1800	1163	2585
2250	2250	315	337.5	450	DN 100	1900	1290	2605
2750	2750	385	412.5	550	DN 100	2000	1340	2695
3500	3500	490	525	700	DN 100	2200	1490	2680
4000	4000	560	600	800	DN 150	2400	1630	2980
5000	5000	700	750	1000	DN 150	2600	1715	3030
6000	6000	840	900	1200	DN 150	2800	1815	3070
7000	7000	980	1050	1400	DN 150	3000	1915	3080
8750	8750	1225	1312.5	1750	DN 200	3400	2290	3280
Type 1350 to 8750, including pre- and afterfilter								



Explanation:

* Related to the intake of the compressor +20°C, 1 bar abs., at a compressed air inlet temperature of +35°C and 7 bar g operating pressure.

Type	Pressure dew point	Inlet temperature	Operating Overpressure (bar)												
			4	5	6	7	8	9	10	11	12	13	14	15	16
HED / ALD	-20°C / -40°C	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
MSD	-70°C	25°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
		30°C													
		35°C													
	-65°C	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
	-60°C	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
	-55°C	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

Example:

V_{nom} = 200m³/h, Inlet temperature = 30°C, Operating pressure = 10 bar, Pressure dewpoint = -40°C

Calculated dryer size: **Ultrapac ALD 0150**

$$V_{korr} = \frac{V_{nom}}{f} = \frac{200 m^3/h}{1.51} = 132.5 m^3/h$$

Donaldson

Donaldson®
Ultrafilter®

Donaldson offers a wide variety of solutions to reduce your energy costs, improve your productivity, guarantee production quality and help preserve the environment.

PRODUCTS

- Activated carbon filters
- Adsorption dryers
- Breathing-air units
- Catridge filters
- Chillers
- Condensate drains
- Coolers
- Cyclone separators
- Demisters
- Disposable filters
- Elements
- Emulsion separators
- Filters
- Fine filters
- Filter housing
- High-performance filters
- High-pressure filters
- Maintenance units
- Medical vacuum filters
- Membrane dryers
- Micro filters
- Oil/vapour absorbers
- Oil/water separators
- Oil/water separation systems
- Pocket filters
- Pre-filters
- Pre-separators
- Process filter elements
- Process filter housing
- Processing plants
- Pure gas filters
- Refrigeration compressed air dryers
- Silicon-free filters
- Steam filters
- Sterile air-conditioning plants
- Sterile filters
- Sub-micro filters
- Systems engineering
- System solution
- Vacuum filters
- Vent filters

SERVICES

- Air Audit – Detailed analysis with optimisation action plan
- Air flow measurement
- Air Performance – Optimisation of compressed air networks
- Air Survey – Analysis of compressed air systems
- Condensate sampling
- Dew point measurement
- Differential pressure measurement
- Integrity tests
- Leak localisation
- Maintenance agreement
- Oil-aerosol measurement
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