Boreas Variopulse

DV 1800 AP - DV 28500 WP Twin

Refrigeration Compressed Air Dryer for medium and big volume flows

Operating mode

Compressed air is fed into the dryer and is precooled in the air-to-air heat exchanger by the outgoing cold compressed air. The precooled air then passes through the refrigerant-to-air heat exchanger where it is further cooled to the required pressure dew point. The moisture in the compressed air condenses out and is collected and discharged automatically.
Finally, the cold discharged air is rewarmed by the incoming compressed air. This saves energy and prevents any moisture forming beyond the dryer in the compressed air system.

Boreas Variopulse, two methods - one purpose: Energy saving

Suction pressure control (DV 1800 AP - DV 2800 AP)

In case of partial load, the suction line of the refrigerant compressor is closed by a solenoid valve. Because of this, only a partial amount of refrigerant is sucked and compressed by the compressor which means reduced load and therefore reduced power consumption. In case of lower partial load or zero load, the compressor is switched off completely by the Variopulse controller at times.

Frequency converter control (DV 3500 AP - DV 28500 WP Twin)

The speed of one of the refrigerant compressors is controlled by the Variopulse control via a frequency converter. The other compressors are switched on if required (partial load or full load). This leads to a reduction up to 90 % of the nominal power consumption.

Additional advantages of the new dryer generation:

- Variopulse-controlling for the hole range as standard
- CAN-bus interface
- Datatransfer optional
- Lighted multi functional display
- Continius dew point without any peaks
- Load controlled energy consumption, reduction up to 90 % of the nominal energy consumption
- Level controlled drain UFM-T100
- Display is changeable from °C to °F
- Max. operation parameter, inlet temp. 70 °C, ambient temp. 50 °C and working pressure 16 bar g for the whole series
- Generously sized air-to-air and refrigerant-to-air aluminium heat exchanger with a large po wer density and generously dimensioned flow channels
- One-component refrigerant R134a, Ozone-depleting factor zero
- Compact and easy to install cabinets

The Multi Functional Display shows the following parameters:

- Current pressure dew point
- Operation mode Normal/Summer/Autom.
- Power consumption related to the whole hours of operation
- Alarm signal
- Alarm history
- Maintenance required
- Operation hours
- Fridge compressor on/off
- Current energy consumption

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Technical data

Donaldson Ultrafilter®

Boreas Variopulse DV 1800 AP - DV 28500 WP Twin

Technical data										
Housing	Type	Volume flow	Volume flow	Pressure drop	Power supply	Power consumption kW			Cooling air	Cooling water
		m³/h	m³/min	bar	3~ / 50Hz	100 % Full load	50 % Part load	0% Zero load	m³/h	m³/h
0	DV 1800 AP	1800	30.00	0,12	400 V	3,1	1,7	0,4	4800	1,0
	DV 2000 AP	2000	33.33	0,14	400 V	3,2	1,9	0,4	4800	1,1
	DV 2300 AP	2300	38.33	0,19	400 V	3,4	2,0	0,4	4800	1,3
	DV 2800 AP	2800	46.67	0,24	400 V	3,9	2,3	0,5	5200	1,6
1	DV 3500 AP	3500	58.33	0,11	400 V	5,9	3,4	0,7	9600	2,0
	DV 4300 AP	4300	71.66	0,16	400 V	6,6	3,8	0,8	9600	2,5
	DV 5500 AP	5500	91.67	0,24	400 V	8,0	4,6	1,0	10400	2,9
2	DV 7000 WP	7000	116.67	0,19	400 V	9,9	5,6	1,2	19200	4,0
	DV 8750 WP	8750	145.83	0,17	400 V	12,4	7,0	1,6	19200	5,2
	DV 10500 WP	10500	175.00	0,22	400 V	14,6	8,2	1,8	20800	6,4
3	DV 12500 WP	12500	208.33	0,22	400 V	18,6	10,3	2,3	23000	7,5
	DV 14250 WP	14250	237.50	0,20	400 V	20,2	11,2	2,5	23000	8,5
Twin	DV 17500 WP	17500	291,67	0,17	400 V	24,8	14,0	3,1	38400	10,4
	DV 21000 WP	21000	350.00	0,22	400 V	29,2	16,5	3,7	41600	12,8
	DV 25000 WP	25000	416,67	0,22	400 V	36,7	20,4	4,6	46000	15,0
	DV 28500 WP	28500	475,00	0,20	400 V	40,5	22,5	5,1	46000	17,0

Explanations:

Volume flow (m³/h) in relation to intake state of air compressor +20°C, 1 bar, at compressedair inlet temperature of +35°C, ambient temperature / cooling water of +25°C and an operating pressure of 7 bar, +3°C pressure dew point in accordance with DIN ISO 7183.

Operating pressure:
max. 16 bar

Inlet temperature:
max. +70°C

Ambient temperature:
min. +2°C max. +50°C

Noise pressure level:
dB (A) < 80

Working pressure	bar g	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Factor	f_p	0.60	0.70	0.80	0.88	0.94	1.0	1.04	1.06	1.09	1.10	1.12	1.14	1.15	1.16	1.17

Compressed air inlet temperature	°C	30	35	40	45	50	55	60	65	70
Factor	f_{ti}	1.20	1.00	0.82	0.67	0.55	0.45	0.38	0.34	0.30

Ambient temperature / cooling water temperature	°C	25	30	35	40	45	50
Factor	f_{tc}	1.00	0.98	0.93	0.84	0.72	0.56

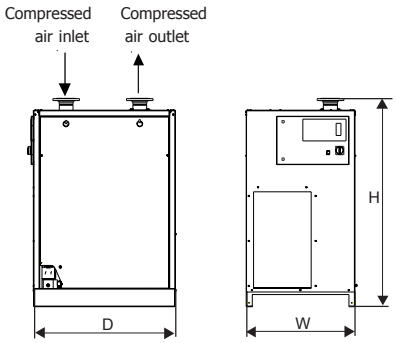
Dew Point	°C	3	5	7	10	15
Factor	f_{ta}	1.00	1.10	1.21	1.35	1.58

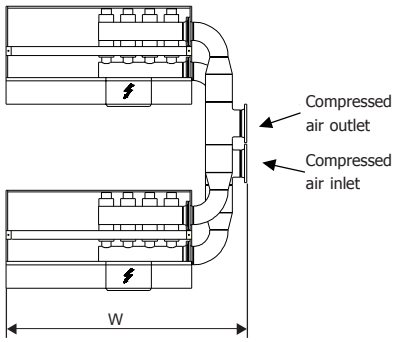
Corrected dryer capacity =
Standard dryer capacity x f_p x f_{ta} x f_{tc} x f_{ti}

Technical alterations reserved (TS/2005/02/15)

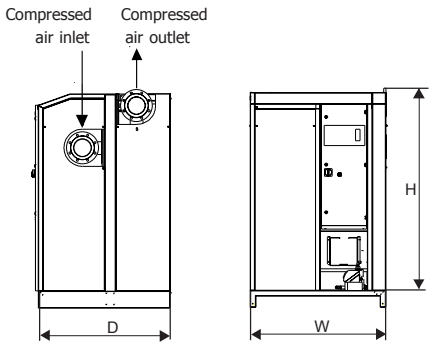
Dimension Sheet

Boreas Variopulse DV 1800 AP - DV 28500 WP Twin

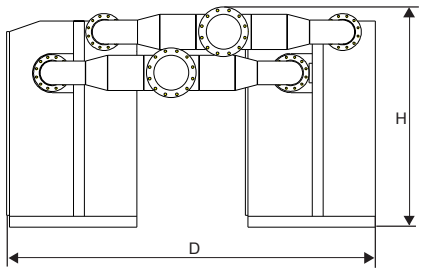




DV 1800 AP- 2800 AP



DV 3500 AP- 14250 WP



DV 17500 WP- 28500 WP

Dimensions							
Housing	Type	Air connection	Condensate drain	Weight	Dimensions		
		DN	R	kg	W	H	D
0	DV 1800 AP	100	3/4" ; 1/4"	412	900	1725	1175
	DV 2000 AP	100	3/4" ; 1/4"	420	900	1725	1175
	DV 2300 AP	100	3/4" ; 1/4"	425	900	1725	1175
	DV 2800 AP	100	3/4" ; 1/4"	435	900	1725	1175
1	DV 3500 AP	150	3/4" ; 1/4"	610	1200	1940	1200
	DV 4300 AP	150	3/4" ; 1/4"	630	1200	1940	1200
	DV 5500 AP	150	3/4" ; 1/4"	670	1200	1940	1200
2	DV 7000 WP	200	3/4" ; 1/4"	995	2225	1970	1200
	DV 8750 WP	200	3/4" ; 1/4"	1165	2225	1970	1200
	DV 10500 WP	200	3/4" ; 1/4"	1225	2225	1970	1200
3	DV 12500 WP	250	2x 3/4" ; 1/4"	1710	3345	2030	1200
	DV 14250 WP	250	2x 3/4" ; 1/4"	1940	3345	2030	1200
Twin	DV 17500 WP	250	2x 3/4" ; 1/4"	2730	2885	1970	3400
	DV 21000 WP	300	2x 3/4" ; 1/4"	2890	2885	1970	3400
	DV 25000 WP	350	4x 3/4" ; 1/4"	3860	4145	2080	3400
	DV 28500 WP	350	4x 3/4" ; 1/4"	4320	4145	2080	3400

Energy savings

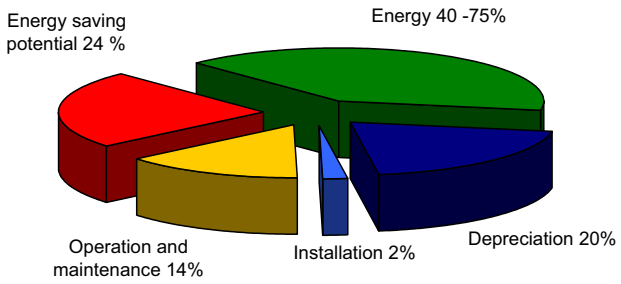
Energy consumptions of the different systems in comparison				
	Boreas Variopulse DV 7000 WP	**Standard refrigeration compressed air dryer with hot gas bypass**	**Standard refrigeration compressed air dryer with storage mass**	**Standard refrigeration compressed air dryer speed controlled**
Volume flow	7000 m³/h	7000 m³/h	7000 m³/h	7000 m³/h
Pressure dew point	3 °C	3 °C	3 °C	3 °C
Energy consumption per year	32003 kWh	60574 kWh	49260 kWh	42965 kWh
Energy costs per year	**2560,- Euro**	**4846,- Euro**	**3941,- Euro**	**3437,- Euro**

This example of energy saving relates to these basic conditions:
Industrial production with one-shift operation, 5 work days per week, stand-by operation during idle periods and an electricity tariff of 8 Eurocent per kWh – the pressure drop is not included in this calculation, it leads to additional energy costs of 40 – 80%

Variopulse: The intelligent dryer control

This microprocessor based controller is the heart of this dryer generation. Values like cooling temperature, pressure in the refrigeration cycle, ambient temperature as well as dryer specific parameters are processed and the current operation conditions are calculated so that a demand-oriented control of the refrigeration system is possible by using the suction pressure control or a frequency converter. This leads to considerable energy savings of up to 90 % related to the nominal power consumption. The pulsating measuring (serveral times per second) and the aluminium heat exchanger's function as a cold storage enable the system to quickly respond to a load change without any dew point peaks occuring. The pressure dew point constantly remains at 3 °C regardless of the load profile.

Average cost distribution for compressed air treatment



This diagram illustrates the very large share of energy costs related to the initial costs (depreciation). This means that the energy costs normally exceed the initial costs considerably during the life cycle of a product of a refrigeration compressed air dryer.

Next to the cost reduction, this energy saving also stands for environment protection because with every additionally consumed kWh the environment is polluted with 0,56 kg CO_2 which in turn increases the global warming.