DWS 450 - 750 VSD+

Atlas Copco

DRY SCREW VACUUM PUMP

DWS 750 VSD+

Atlas Copco

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Introduction & launch presentation

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Project Goals



Project Arrow: DWS 450 – 750 VSD+

- By adopting the knowledge of dry screw vacuum pumps from within the Atlas Copco Group the Arrow project, delivering the DWS 450/750 VSD+, offers a true Atlas Copco branded series of dry screw vacuum pumps for numerous applications and markets with a cost competitive edge.
- Outcome is two variants, a 450m3/h and 750m3/h water cooled, dry screw vacuum pump.



The design



Pump exhaust connection

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The design





Project deliverables

Description	DWS 450 VSD+
Part number	1950813601
Description	DWS 750 VSD+
Part number	1950813600





Technical data - DWS 450 VSD+

MetricImperial Water CooledPerformancePeak pumping Speed m^3h^{-1} 450CFM265Ultimate pressurembar<0.01Torr<0.008@ultimate pressureKW7hp9@peak pumping loadKW11hp15/acuum ConnectionInlet connectionISO100ISO100ISO100Exhaust connectionConnectionG1/2" female threadsG1/2" female threadsFlowI-min ⁻¹ 10gal-min ⁻¹ 2,6Supply pressure(max)bar6,9psig14,5Purge GasConnectionG1/2" female threadsG1/2" female threadsPurge GasConnectionG1/2" female threadsG1/2" female threadsNoisebar0.128/1012NoiseMart0.128/2.5-6.912NoiseMart0.128/2.5-6.912NoiseMart0.128/2.5-6.912NoiseMB(A)<540%F41.104						
Image: Second				Metric		Imperial
Image: Heak pumping Speed m^3h^{-1} 450 CFM 265 Performance Peak pumping Speed m^3h^{-1} 450 CFM 265 Full Load Power @ultimate pressure Mw 7 hp 9 @peak pumping load KW 7 hp 9 9 /acuum Connection Inlet connection ISO100 ISO100 ISO1000 Khaust connection Connection NWS0 NWS0 Solo Connection Imin ⁻¹ 10 gal-min ⁻¹ 2,6 Supply pressure(max) bar 6,9 psig 100 DP across pump(min) bar 1 psig 14,5 Temperature °C 5-40 °F 41.104 Purge Gas Pressure bar 2,5-6.9 psig 43.5-100 Shaft seal purge flow I-min ⁻¹ 12 I-min ⁻¹ 12 Gas Ballast flow I-min ⁻¹ 12 I-min ⁻¹ 12 Gas Ballast flow				Water Cooled		iter Cooled
Performance Peak pumping Speed m^3h^{-1} 450 CFM 265 Ultimate pressure mbar <0.01						
	Porformanco	Peak pumping Speed	m ³ h ⁻¹	450	CFM	265
	Ferrormance	Ultimate pressure	mbar	<0.01	Torr	<0.008
Operation $@$ peak pumping load KW 11 hp 15 Vacuum Connection Inlet connection ISO100 ISO100 ISO100 Exhaust connection Connection Image: Connection	Full Load Dowor	@ultimate pressure	KW	7	hp	9
Inlet connection Inlet connection Isoloo Exhaust connection A NW50 NW50 Exhaust connection G G1/2" female threads G1/2" female threads Connection Imin ⁻¹ G1/2" female threads G1/2" female threads Flow Imin ⁻¹ 10 gal-min ⁻¹ 2,6 Supply pressure(max) bar 6,9 psig 100 DP across pump(min) bar 1 psig 14,5 Temperature °C 5-40 °F 41-104 Purge Gas Pressure bar G1/2" female threads G1/2" female threads Purge Gas Pressure bar 2.5-6.9 psig 43.5-100 Shaft seal purge flow I-min ⁻¹ 12 I-min ⁻¹ 12 Gas Ballast flow I-min ⁻¹ 0-128 I-min ⁻¹ 0-128 Noise dB(A) <64	ruii Loau Fowei	@peak pumping load	КW	11	hp	15
Exhaust connection NW50 NW50 Connection G1/2" female threads G1/2" female threads Flow I-min ⁻¹ 10 gal-min ⁻¹ 2,6 Supply pressure(max) bar 6,9 psig 100 DP across pump(min) bar 1 psig 14,5 Temperature °C 5-40 °F 41-104 Purge Gas Connection G1/2" female threads G1/2" female threads Shaft seal purge flow I-min ⁻¹ 12 I-min ⁻¹ 12 Gas Ballast flow I-min ⁻¹ 0-128 I-min ⁻¹ 0-128 Noise dB(A) <64	Vacuum Connections	Inlet connection		ISO100		ISO100
Connection G1/2" female threads G1/2" female threads Flow I-min ⁻¹ 10 gal-min ⁻¹ 2,6 Supply pressure(max) bar 6,9 psig 100 DP across pump(min) bar 1 psig 14,5 Temperature °C 5-40 °F 41.104 Purge Gas Connection G1/2" female threads G1/2" female threads Pressure bar Connection G1/2" female threads G1/2" female threads Pressure bar Connection G1/2" female threads G1/2" female threads Pressure bar 2.5-6.9 psig 43.5-100 Shaft seal purge flow I-min ⁻¹ 12 I-min ⁻¹ 12 Gas Ballast flow I-min ⁻¹ 0-128 I-min ⁻¹ 0-128 Noise dB(A) <64	vacuum connections	Exhaust connection		NW50		NW50
Flow I-min ⁻¹ 10 gal-min ⁻¹ 2,6 Supply pressure(max) bar 6,9 psig 100 DP across pump(min) bar 1 psig 14,5 Temperature °C 5-40 °F 41:104 Purge Gas Connection G1/2" female threads G1/2" female threads Pressure bar 2.5-6.9 psig 43.5-100 Shaft seal purge flow I-min ⁻¹ 12 I-min ⁻¹ 12 Gas Ballast flow I-min ⁻¹ 0-128 I-min ⁻¹ 0-128 Noise dB(A) <64		Connection		G1/2" female threads		G1/2" female threads
Supply pressure(max) bar 6,9 psig 100 DP across pump(min) bar 1 psig 14,5 Temperature °C 5-40 °F 41-104 Connection G1/2" female threads G1/2" female threads G1/2" female threads Purge Gas Pressure bar 2.5-6.9 psig 43.5-100 Shaft seal purge flow I-min ⁻¹ 12 I-min ⁻¹ 12 Gas Ballast flow I-min ⁻¹ 0-128 I-min ⁻¹ 0-128 Noise dB(A) <64		Flow	l∙min ⁻¹	10	gal∙min⁻¹	2,6
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Cooling Water	Suppply pressure(max)	bar	6,9	psig	100
Temperature °C 5-40 °F 41-104 Purge Gas Connection G1/2" female threads G1/2" female threads Pressure bar $2.5-6.9$ psig $43.5-100$ Shaft seal purge flow I·min ⁻¹ 12 I·min ⁻¹ 12 Gas Ballast flow I·min ⁻¹ $0-128$ I·min ⁻¹ $0-128$ Noise dB(A) <64		DP across pump(min)	bar	1	psig	14,5
Connection G1/2" female threads G1/2" female threads Pressure bar 2.5-6.9 psig 43.5-100 Shaft seal purge flow I·min ⁻¹ 12 I·min ⁻¹ 12 Gas Ballast flow I·min ⁻¹ 0-128 I·min ⁻¹ 0-128 Noise dB(A) <64		Temperature	°C	5-40	°F	41-104
Purge Gas Pressure bar 2.5-6.9 psig 43.5-100 Shaft seal purge flow I·min ⁻¹ 12 I·min ⁻¹ 12 Gas Ballast flow I·min ⁻¹ 0-128 I·min ⁻¹ 0-128 Noise dB(A) <64		Connection		G1/2" female threads		G1/2" female threads
Shaft seal purge flow I-min ⁻¹ 12 I-min ⁻¹ 12 Gas Ballast flow I-min ⁻¹ 0-128 I-min ⁻¹ 0-128 Noise dB(A) <64		Pressure	bar	2.5-6.9	psig	43.5-100
Gas Ballast flow I·min ⁻¹ 0-128 I·min ⁻¹ 0-128 Noise dB(A) <64	Purge Gas	Shaft seal purge flow	l∙min ⁻¹	12	l∙min ⁻¹	12
Noise dB(A) <64 dB(A) <75 Operating Temperature °C 5-40 °F 41-104		Gas Ballast flow	l∙min ⁻¹	0-128	l∙min ⁻¹	0-128
Operating Temperature °C 5-40 °F 41-104		Noise	dB(A)	<64	dB(A)	<75
		Operating Temperature	°C	5-40	°F	41-104
Operating data	Operating data					
Exhaust Back Pressure(Max) mbar 1200 psia 17,4		Exhaust Back Pressure(Max)	mbar	1200	psia	17,4
Lubrication(as supplied) PFPE Drynert 25/6 PFPE Drynert 25/6		Lubrication(as supplied)		PFPE Drynert 25/6		PFPE Drynert 25/6

- Performance curve to be tested/created
- Work in progress



Technical data - DWS 750 VSD+

			Metric		Imperial
			Water Cooled		iter Cooled
			750		750
Porformanco	Peak pumping Speed	m ³ h ⁻¹	740	CFM	435
renormance	Ultimate pressure	mbar	<0.01	Torr	<0.008
Full Load Dowor	@ultimate pressure	KW	8	hp	11
Full Load Power	@peak pumping load	KW	22	hp	30
Vacuum Connections	Inlet connection		ISO100		ISO100
vacuum connections	Exhaust connection		NW50		NW50
	Connection		G1/2" female threads		G1/2" female thread
	Flow	l∙min ⁻¹	12	gal∙min⁻¹	3,2
Cooling Water	Suppply pressure(max)	bar	7	psig	100
	DP across pump(min)	bar	1	psig	14,5
	Temperature	°C	5-40	°F	41-104
	Connection		G1/2" female threads		G1/2" female thread
During Con	Pressure	bar	3-6.9	psig	43.5-100
Purge Gas	SSP flow	l∙min ⁻¹	12	l·min ⁻¹	12
	Gas Ballast flow	l∙min ⁻¹	0-130	l·min ⁻¹	0-130
	Noise	dB(A)	<70	dB(A)	<70
	Operating Temperature	°C	5-40	°F	41-104
Operating data	Exhaust Back Pressure				
	(Max)	mbar	1200	psia	17,4
	Lubrication(as supplied)		PFPE Drynert 25/6		PFPE Drynert 25/6





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General technical data

Item Description		Rating	Units
	Intended use	Indoor	
	Ambient temperature range: Operating Storage	5 to 40 -45 to 55	°C °C
Operating conditions	Maximum relative humidity:	80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40 °C	
	Maximum operating altitude	2000	m
	Pollution degree	2 (IEC 61010)	
	Pump, shaft and rotors	Cast SG iron	
Materials in contact	Seals	PTFE and fluoroelastomer	
with the process gas	Gas system	Carbon steel, brass, PTFE and fluo- roelastomer	
Degree of protection Hazardous electrical sub sys- tem		IP21D (IEC60529)	
Lubrication Oil type		PFPE Drynert 25/6 (recommended) Fomblin [®] 25/6 (alternative) Krytox [®] 1525 (alternative)	

Mass (excluding packaging)	679	kg
Noise level (at ultimate with a piped exhaust)	< 70	dB(A)
Typical vibration level at inlet	< 1.5	mm/s
Pump inlet flange (bolted)	ISO100	1
Exhaust gas outlet	NW50 [‡]	(.)
Lubricant volume	2.8	litre



General technical data

Water cooling system data

Description	Rating	Units
	6.9	barg
Maximum supply pressure	100	psig
Maximum allowable system dif- ferential pressure	1.5	bar
Minimum required pressure dif- ferential across supply and re- turn	1.2	bar
Supply temperature range	5 - 40*	°C
Water type	Treated or non-corrosive indus- trial	e e
Maximum particle size	0.2	mm ²
Acidity	7.0 to 10.5	pH
Hardness	<250	ppm of CaCO ₃ (<250 mg of Ca- CO ₃ per litre)
Total Dissolved Solids (TDS)	<1500	mg/l
Total Suspended Solids (TSS)	<10	mg/l
Specific conductivity	2000	μS/cm
Materials in contact with the cooling water	Stainless steel, Nitrile, PTFE, brass, polyamide and fluoroe- lastomer	
Water inlet connection	1/2 inch BSP female	
Water outlet connection	1/2 inch BSP female	

* Maximum coolant temperatures may need to be reduced if Glycol or other coolants are used dependent on the dilution and type.

High flow purge/solvent flush data

Feature	Specification	Rating
Pneumatic valve gas sup- ply	Nitrogen or clean dry air	2.5 - 6.9 barg (36 - 100 psig)
Pneumatic valve inlet con- nection	3/8 inch compression fitting	
High flow purge gas	Air, nitrogen or other inert gas which is compatible with process	Typically 185 slm at atmos- pheric pressure at the purge inlet connection

Characteristics	Rating	Units
Purge gas supply pressure range	2.5 - 6.9	bar gauge
	36 - 100	psi gauge
Purge gas supp <mark>l</mark> y quality	JSO 8573 - Class 2	



The controller



- MK5 Elektronikon controller
- Features:
 - Start/Stop command of the pump system
 - Enables 'pressure setpoint control' with true variable speed drive (VSD+) or runs on a 'force max speed' rule.
 - Monitors and logs events and parameters such as running hours, inlet pressure, temperatures and service counters.
 - Connected to Yaskawa GA500 inverter
 - Controls "Pre-Purge" and "Post-Purge" stages.
 - Offers remote monitoring through LAN and various BUS protocols.
 - Optional GENIUS-Box (remote connectivity) function available.



The inlet valve



- Inlet valve comes as standard in the scope of supply.
- Purpose of the inlet valve:
 - Enables pressure setpoint control, isolates from process when pump goes in shutdown/standby mode.
 - Valve is controlled by the MK5 Elektronikon controlled to allow warm-up and shutdown procedure (pre and post purge program)
 - Valve will close in event of alarm or power failure
 - Isolate the pump from process when service actions are required
 - Allows usage in a central vacuum system (multi-pump system)





