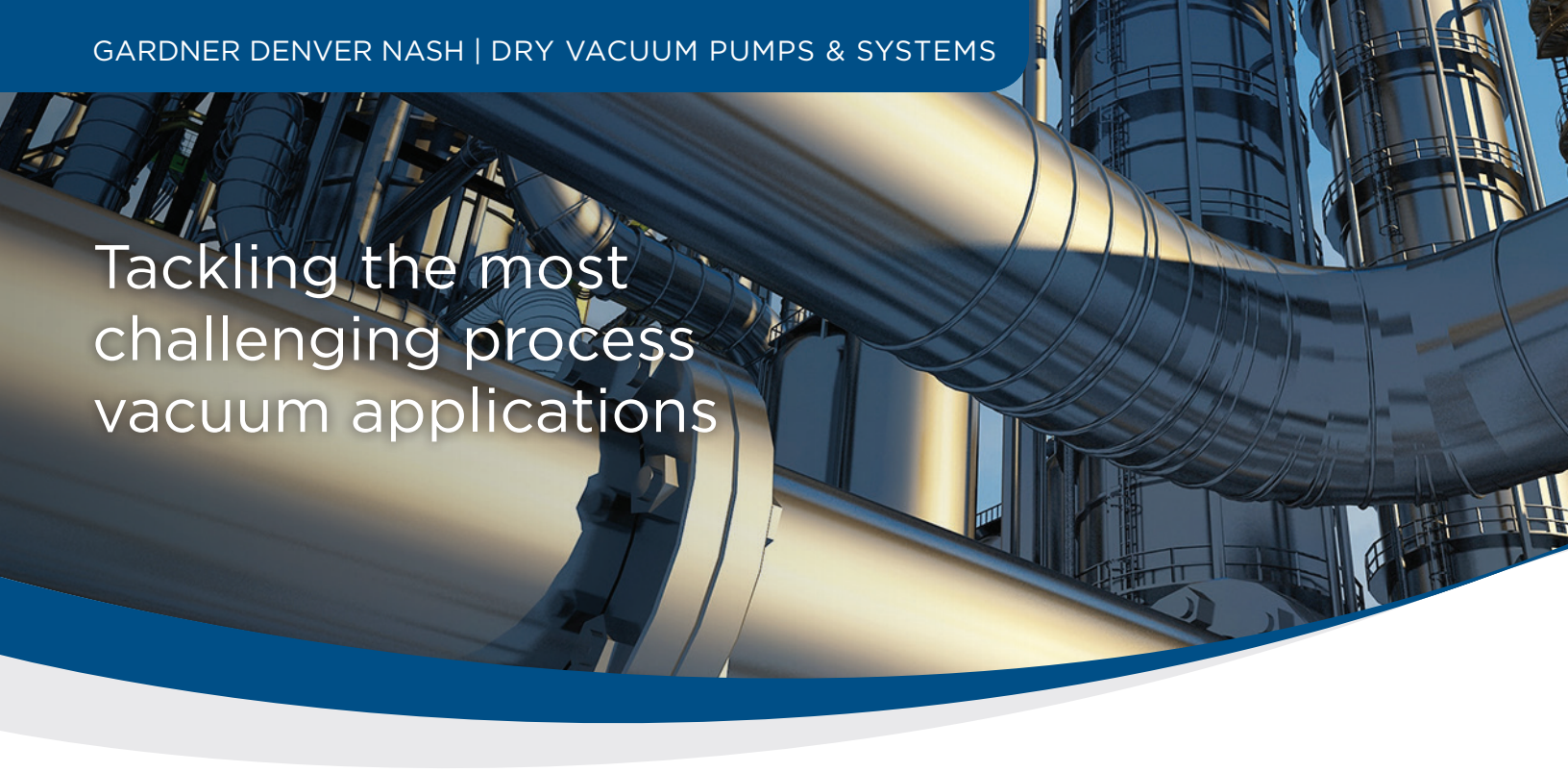
NASH
by Gardner Denver

DRY VACUUM PUMPS & SYSTEMS

FOR CHEMICAL & PHARMACEUTICAL APPLICATIONS



Tackling the most challenging process vacuum applications

NASH® Delivers Results

For over 110 years, our global customer base has enjoyed the benefits of our industry-leading experience and engineering expertise. Nash designs, delivers and services world-class vacuum solutions that tackle the rigorous demands of a vast range of industrial processes. Our reliable and well-engineered solutions guarantee the quality and performance even the most harsh industries demand.

Nash offers a complete range of vacuum solutions such as liquid ring vacuum pumps, compressors & systems, steam ejectors, hybrid vacuum systems, as well as dry vacuum pumps & systems.

NASH® DRY-PRO® dry screw vacuum pumps continue the tradition of delivering high quality, best-in-class vacuum solutions for chemical and pharmaceutical industries.

Need safe and reliable vacuum solutions? You need NASH.

- Decades of experience
  - Over 110 years of applications expertise
- Safe and reliable
  - The DRY-PRO VSB series includes independently explosion-tested models and is compliant to international standards
- Expert engineers and advanced technical support
  Tailored solutions to meet your needs

Applications Engineering Expertise

Nash has the technical expertise to provide comprehensive product and applications engineering support. Our approach to your needs is flexible and accommodating. We work directly with our customers to understand their process requirements, enabling our expert engineers to design and deliver the optimal solution.

Clean, Reliable & Flexible Vacuum

The NASH DRY-PRO is a tireless workhorse. The simple yet sophisticated design of the pump ensures it keeps running, even under challenging situations, making it highly suitable to chemical vacuum applications. This robust machine delivers reliable and efficient performance.

The entire operation is dry, with no lubrication in the pumping chamber. This design guarantees no contamination or pollution caused by the pump. Furthermore, there is no corrosion because process media are kept in the vapor phase.

DRY-PRO®

DRY-PRO pumps operate at any pressure between blank off and atmospheric, giving you flexible vacuum when you need it.

SUCTION CAPACITY:	UP TO 1,500 ACFM (UP TO 2,500 M^3/H^{-1})
VACUUM RANGE:	TO 0.02 TORR (0.03 MBAR)
CERTIFICATION:	INDEPENDENTLY EXPLOSION-TESTED MODELS AVAILABLE

Unparalleled System Performance

> Low cost of ownership
- no effluent treatment cost, mechanically efficient

> Environmentally friendly
- energy efficient due to low power consumption in operating range

> Reliable performance
- smooth and robust

> Flexible vacuum
- any pressure between blank off (0.02 Torr/0.03 mbar) and atmospheric pressure

> Easy to install
- integrates with plant controls

> Low maintenance
- extended service intervals and bearing life

> System automation
- Easy integration with plant controls
- Improves reliability and safety

Handle an Array of Chemicals

- adhesives
- acetates
- alcohols
- amines
- aromatics (BTX)
- diols
- ethers
- ethylene dichloride
- ethylene oxide
- fatty acids
- glycerides
- hexane
- halides (HCl/HBr/HF)
- isocyanates
- ketones
- MEK
- methylene chloride
- mineral acids
- nitric acid
- organic acids
- paraffins
- pentane
- phenol
- phosphoric acid
- polycarbonates
- polyglycols
- polymers
- sulphides
- triethylamine
- tetrahydrofuran

Modular Dry Vacuum Systems

Quality systems designed with the accumulated experience of industry experts

Nash leverages the vast experience of its engineers who have been designing safe and reliable chemical and pharmaceutical process vacuum systems for decades. Their accumulated knowledge has resulted in the design of a well-engineered modular system that guarantees performance and avoids common pitfalls. This design philosophy is used by Nash globally, which means you receive a consistent, reliable solution across all regions.

NASH pre-engineered modules are designed to meet your requirements while maximizing flexibility. This philosophy also makes it easier to design custom configurations that can be engineered-to-order.

One of the major benefits of our design is that it allows our solutions to be easily and speedily adapted. We can quote and ship quickly, delivering in as short a time as 8 weeks.

What's more, safety is of paramount importance to Nash. That's why every vacuum system is reviewed and built to rigorous standards to ensure reliability and safety at all times.

Trust NASH for quality, well-engineered systems, wherever you are.

Modular System Example

Module Highlights

1. Mechanical booster
2. Inlet isolation valve
3. Flame arresters
4. Shaft seal, inlet and interstage nitrogen purges (piping shown)
5. Solvent flush vessel
6. Modular skid
7. Inlet knock-out pot
8. Receivers
9. Exhaust condenser

Modules Not Pictured

- Direct and indirect cooling systems
- Controls
- Junction box
- Dust filters
- Exhaust silencers

TECHNICAL DATA

VSB 120 - 800 CHEMICAL DRY PUMPS	Units	VSB 120		VSB 200		VSB 320		VSB 430		VSB 800	
		50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
Capacity	m^3/h	86	97	130	143	226	246	306	382	525	637
	cfm	51	57	77	84	133	145	180	225	309	375
Ultimate (blank-off) vacuum	mbar	0.13	0.07	0.07	0.03	0.04	0.03	0.04	0.03	0.04	0.01
	Torr	0.1	0.05	0.05	0.02	0.03	0.02	0.03	0.02	0.03	0.01
Maximum back pressure - standard	barg	0.3									
	psig	4.2									
Power consumption at 10 mbar, (7.5 Torr)	kW	2.2	2.5	2.8	3.1	4.7	5.2	6.4	7	10.9	12.9
	hp	2.9	3.3	3.8	4.2	6.2	6.9	8.5	9.4	14.5	17.2
Standard motor (400 - 690V +10%, 3 ph, 50 Hz)	kW	3		5.5		7.5		11		15	
Standard motor (200 - 460V +10%, 3 ph, 60 Hz)	hp	5		7.5		10		15		20	
Minimum cooling water flow rate, (adjustable)	lph	120	180	240	265	480	530	660	730	1200	1320
	US gpm	0.5	0.8	1.1	1.2	2.1	2.3	2.9	3.2	5.3	5.8
Cooling water supply temperature.[++]	°C	5 - 35*		5 - 35*[++]		5 - 35*[++]		5 - 35*		5 - 35*	
	°F	40 - 95*		40 - 95*[++]		40 - 95*[++]		40 - 95*		40 - 95*	
Cooling water supply pressure range.	barg	1 - 10									
	psig	15 - 145									
Shaft seal purge flow, drive end, (normal)	lph	200	200	200	200	300	350	300	350	450	500
	cfh	7	7	7	7	10.6	12.5	10.5	12.5	16	17.5
Shaft seal purge supply pressure range	barg	2 - 10									
	psig	29 - 145									
Seal purge regulated pressure, (normal/maximum)	barg	0.2 / 0.6									
	psig	3 / 9									
Noise (maximum with exhaust silencer)	dB(A)	72	72	73	75	74	85	76	85	78	85
Weight, (bareshaft pump)	kg	150		220		300		400		600	
	lbs	330		484		660		880		1320	
Oil quantity	litres	0.5		1		1.8		2		2.2	
	US quarts	0.5		1.1		1.9		2.1		2.3	
Grease quantity	ml	22		22		24		24		42	
	US fluid oz	0.74		0.74		0.81		0.81		1.42	
Process connection, inlet	ANSI/DIN	1.5"/ DN40	1.5"/ DN40	1.5"/ DN40	1.5"/ DN40	2"/ DN50	2"/ DN50	2.5"/ DN65	3"/ DN80	4"/ DN100	4"/ DN100
Process connection, outlet	ANSI/DIN	1.5"/ DN40	1.5"/ DN40	1.5"/ DN40	1.5"/ DN40	1.5"/ DN40	1.5"/ DN40	2"/ DN50	2.5"/ DN65	2.5"/ DN65	3"/ DN80

VSB 1000 - 2700 CHEMICAL DRY PUMPS	Units	VSB 1000		VSB 1500		VSB 1800		VSB 2700	
		50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
Capacity	m^3/h	694	765	1190	1376	1350	1623	2100	2549
	cfm	408	450	700	810	795	955	1236	1500
Ultimate (blank-off) vacuum	mbar	0.04	0.01	0.13	0.07	0.13	0.07	0.13	0.07
	Torr	0.03	0.01	0.10	0.05	0.10	0.05	0.10	0.05
Maximum back pressure - standard	barg	0.3							
	psig	4.2							
Power consumption at 10 mbar, (7.5 Torr)	kW	15.5	16.0	26.4	26.8	28.0	30.0	45.3	48.5
	hp	20.7	21.3	35.4	36.0	37.3	40.0	60.8	65.1
Standard motor (400 - 690V +10%, 3 ph, 50 Hz)	kW	18.5		37		45		55	
Standard motor (200 - 460V +10%, 3 ph, 60 Hz)	hp	25		50		60		75	
Minimum cooling water flow rate, (adjustable)	lph	1200	1320	2160	2380	2400	2640	2880	3170
	US gpm	5.3	5.8	9.5	10.5	10.6	11.6	12.7	14.0
Cooling water supply temperature.[++]	°C	5 - 35*		5 - 35*[++]		5 - 35*[++]		5 - 35*	
	°F	40 - 95*		40 - 95*[++]		40 - 95*[++]		40 - 95*	
Cooling water supply pressure range.	barg	1 - 10							
	psig	15 - 145							
Shaft seal purge flow, drive end, (normal)	lph	450	500	660	710	660	710	660	710
	cfh	16.0	17.5	23.0	25.0	23.0	25.0	23.0	25.0
Shaft seal purge supply pressure range	barg	2 - 10							
	psig	29 - 145							
Seal purge regulated pressure, (normal/maximum)	barg	0.2 / 0.6							
	psig	3 / 9							
Noise (maximum with exhaust silencer)	dB(A)	78	85	82	90	82	90	82	90
Weight, (bareshaft pump)	kg	600		1350		1350		1650	
	lbs	1320		2970		2970		3630	
Oil quantity	litres	2.2		4.5		4.5		5	
	US quarts	2.3		4.8		4.8		5.3	
Grease quantity	ml	42		60		60		60	
	US fluid oz	1.42		2.03		2.03		2.03	
Process connection, inlet	ANSI/DIN	4"/ DN100	4"/ DN100	5"/ DN125	5"/ DN125	5"/ DN125	5"/ DN125	6"/ DN150	6"/ DN150
Process connection, outlet	ANSI/DIN	2.5"/ DN65	3"/ DN80	3"/ DN80	3"/ DN80	3"/ DN80	3"/ DN80	4"/ DN100	4"/ DN100

* Consult Garner Denver Nash for other supply temperatures
[+] Upper limit for T4 operations = 25 °C
[++] Depends on cooling system and temperature rating

Trusted Service, Global Support

Know That Your Pumps & Systems Are Protected With Nash®

NASH CERTIFIED™ Support & Service

Every DRY-PRO Pump & System is backed by our global network of service and support.

NASH CERTIFIED™ Field Service Team

Available to supplement your in-house maintenance operations and keep your system running efficiently and reliably. Factory-trained, and located around the globe, NASH Certified Field Service will help you identify needed repairs, prevent costly downtime, and increase mean time between failures.

NASH CERTIFIED™ OEM Parts

Every part is certified and built to our high quality standards using the latest designs and innovations for optimum performance and efficiency. Emergency quick ship parts are available at NASH locations worldwide.

Factory Service

Certified service centers in key industrial regions as well as field service technicians on hand to provide technical guidance and support. We keep your vacuum equipment and processes running smoothly, no matter how challenging the application.

Gardner Denver Nash Products & Systems

NASH® Liquid Ring Vacuum Pumps & Systems

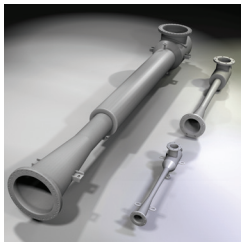
The reliable and durable solution for demanding process applications. Through ongoing commitment to innovation Nash continues to introduce liquid ring vacuum pumps that meet the rigors of the most demanding applications while improving efficiency and lowering total cost of ownership.

NASH® Mag Drive Liquid Ring Vacuum Pumps & Compressors

Provides leak-free performance for applications requiring the highest levels of security. Through a magnetic drive with static o-ring seals, the 2BM series achieves non-contact torque transmission, allowing for a hermetically sealed pump body. This key feature eliminated leaks while reducing maintenance.

NASH Dry Vacuum Pumps & Systems

Designed to meet your specific process needs, NASH dry systems are ready for simple process integration and operation, help minimize installation & operating costs, and reliably meet the rigors of the most demanding applications.



ENER-JET™ Ejectors & Systems

Whether on their own, or as part of a NASH ENER-JET Hybrid Vacuum System, NASH steam jet ejectors are engineered for optimum efficiency, reducing steam consumption while maintaining their ability to handle large volumes at very high vacuum levels.

NASH

Gardner Denver Nash, LLC

www.GDNash.com

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GDN-DP-1136-9th Ed. 11/19

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