

# LIQUID-SPECIFIC PRODUCT LINE: CAST IRON REFRIGERATION AMMONIA PUMPS

4924A Series™ (Replaced 4925 Series™)

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## SERIES DESCRIPTION

Viking's 4924A Series™ Positive Displacement (PD) pumps offer safety, reliability and high efficiency in refrigeration ammonia recirculation applications. Safety is achieved through use of a double mechanical dynamic shaft seal located between bearings for minimum possible shaft run-out, with a pressurized barrier fluid system, and O-ring type static seals where components are joined. Reliability is provided by slow speed operation and low differential pressures, which maximize bearing and seal life. And efficiency is inherent in the PD Internal Gear pumping principle, compared to centrifugal pumps. Viking pumps can usually use at least one motor size smaller than these technologies.

## RELATED PRODUCTS

Cast Iron, 4124A Series™: Catalog Section 1401



HL4924A



K4924A

## OPERATING RANGE

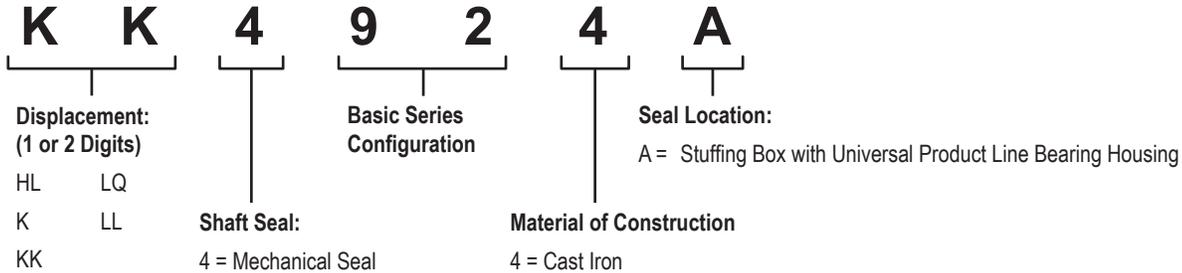
SERIES	NOMINAL FLOW		MAXIMUM PRESSURE		TEMPERATURE RANGE	
	GPM	m <sup>3</sup> h	PSI	Bar	°F	°C
4924A Series™	10 - 60	37.8 - 227	50	3.5	-40 to +225	-40 to +105

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### MODEL NUMBER KEY



### DOUBLE DYNAMIC SEALING

The double mechanical seals provide carbon graphite rotating faces against Ni-Resist stationary seats. Ni-Resist is a metallic face which can be replaced without concern for hairline cracks that can occur when installing ceramic or silicon carbide seals, another safety feature. The area between the inboard and outboard mechanical seals is filled with refrigeration oil supplied by a reservoir mounted above the pump. A unique flush line with valve carries ammonia from behind the rotor to the reservoir, pressurizing the barrier oil to the same pressure seen by the seal inside the pump. The outboard seal sees only oil, and provides a secondary barrier should the inboard seal begin to leak.

The reservoir may be filled with oil using a port on the top, or, an optional filling valve on the side of the pump permits refilling during pump operation. A sight glass allows visual inspection of oil level.

The benefit of double mechanical seals versus sealless magnetic drives is that it is inherently more efficient, requiring less power, because mag drive pumps require recirculation (slip) through the canister area to remove heat generated by eddy currents.

### END CLEARANCE ADJUSTMENT

The 4924A Series™ replaced Viking's *OLD 4925 Series™* Ammonia pumps. The key difference is the bearing housing on the bracket simplifies adjusting end clearance, which helps ensure optimal efficiency and can compensate for wear over time. With this design, you simply rotate the bearing housing clockwise until it stops, then back it off the distance recommended in the Technical Service Manual (TSM 1467) to set the end clearance, and lock it down. The old style required rotating two bearing end caps and measuring end clearance with a feeler gauge, which required removal from service.

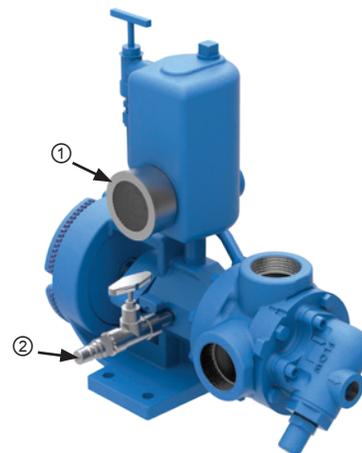
### PRESSURE RELIEF

Positive displacement pumps must be fitted with a pressure relief device to prevent overpressure. Viking's 4924A Series™ pumps are supplied with a Return-To-Tank (RTT) Pressure Relief Valve (PRV) as standard, which routes ammonia from any overpressure situation back to the tank.

### OPTIONAL FEATURES

(Specify these special features when ordering)

- ① **Sight Glass with Frost Shield.**
  - This prevents the sight glass from being covered with frost when the pumping unit is installed in a cold room.
- ② **Filling Valve.**
  - A filling valve can be furnished to permit easy refilling of oil reservoir without stopping pump.
- ③ **Oil Reservoir Heater.** (Not Illustrated)
  - An electric immersion type heater to provide adequate reservoir oil temperature if pumping unit is installed in a cold room.

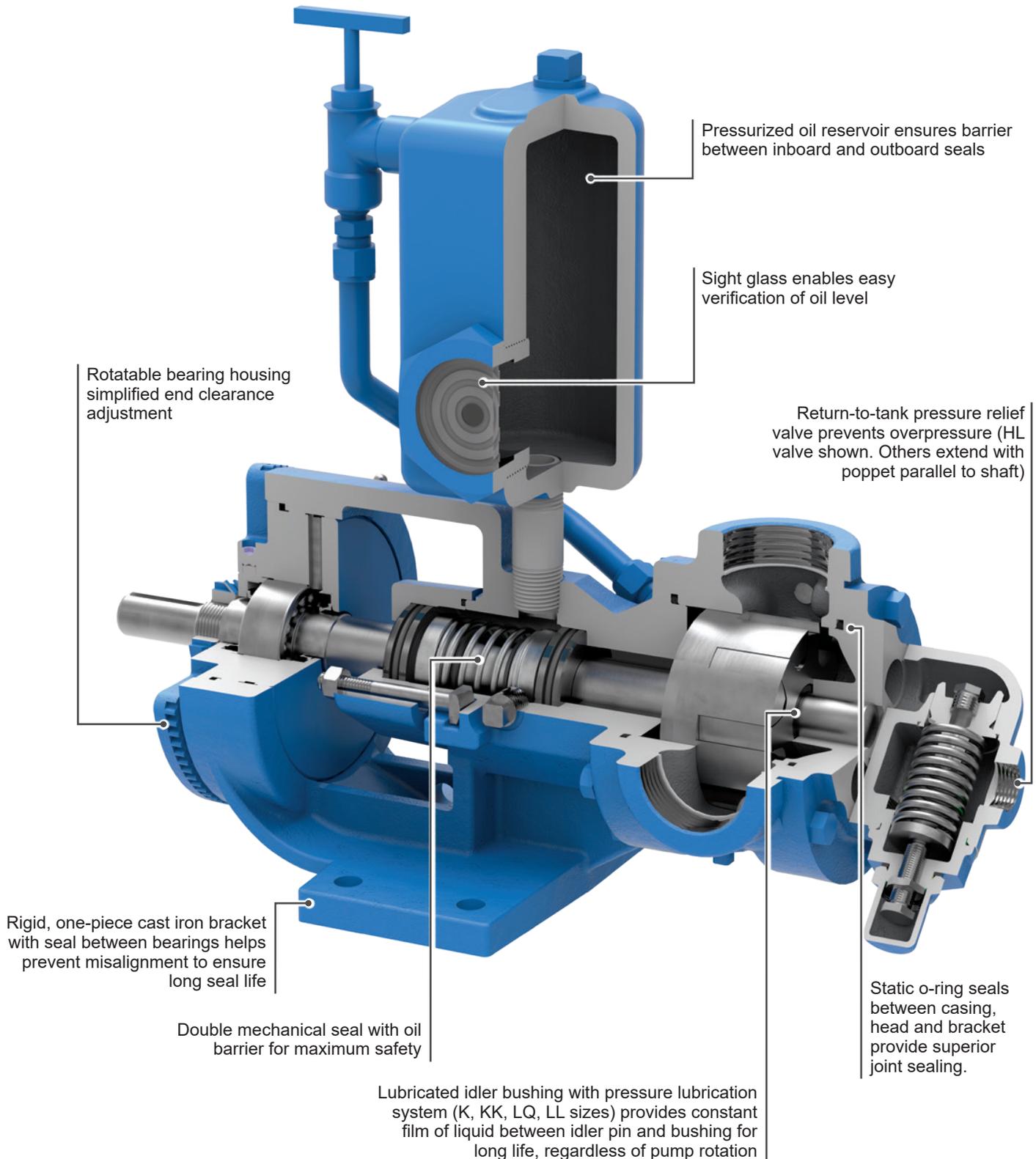


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## FEATURES & BENEFITS



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CAST IRON REFRIGERATION AMMONIA PUMPS**  
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## STANDARD MATERIALS OF CONSTRUCTION

Component	Standard Material
Casing, Head and Bracket	Cast Iron ASTM A48, Class 35B
Rotor	Cast Iron, ASTM A48, Class 35B
Shaft	① Steel, ASTM A108, Grade 1045
② Idler	Cast Iron, ASTM A48, Class 35B
Idler Pin	Hardened Steel, ASTM A108 Grade 10L45
Bracket Bushing	Carbon Graphite
Idler Bushing	Carbon Graphite
Double Mechanical Seal	Carbon vs. Ni-Resist Faces, Neoprene Elastomers
Static O-Ring Seals	Buna
Return-to-Tank Relief Valve	Cast Iron ASTM A48, Class 35B

## SPECIFICATIONS

Model Number	Standard Port Sizes ③	Nominal Capacity		Maximum Speed	Maximum Differential Pressure		Minimum Temperature for Catalog Pump ⑤		Approximate Shipping Weight with PRV & Reservoir	
	Inches	GPM	LPM	RPM	PSIG	Bar	°F	°C	Lbs.	Kg.
HL4924A	1.5	10	37.8	780	50	3.5	-20	-29	70	32
K4924A	2	20	75.7	280	50	3.5	-20	-29	135	62
KK4924A	2	30	113.5	280	50	3.5	-20	-29	140	64
LQ4924A	2.5 ④	45	170	280	50	3.5	-20	-29	215	98
LL4924A	3 ④	60	227	280	50	3.5	-20	-29	230	105

① K, KK, LQ and LL sizes are high strength steel ASTM A434 Type 4140 Grade BC or equivalent.

② HL size cast iron idler is lubrite coated.

③ Suction piping recommended one size larger than pump suction port.

④ ANSI compatible Class 125 Flanged Ports, furnished with NPT companion flanges. All other models NPT ports.

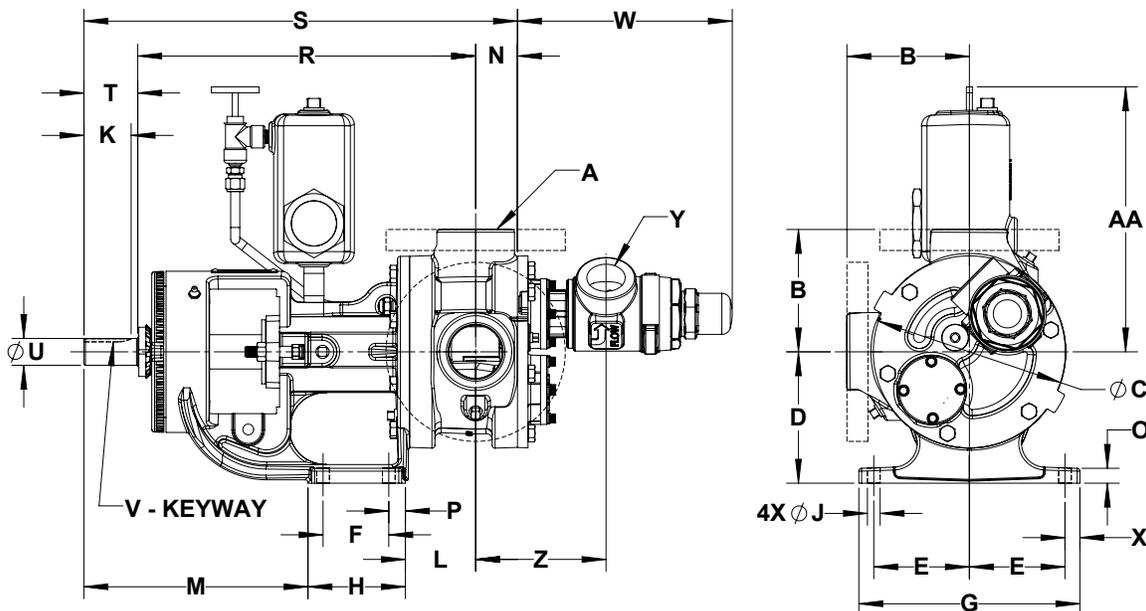
⑤ Pumps can be used to -40°F (-40°C) if provision is made to provide heat to oil in seal chamber.

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## DIMENSIONS – HL, K, KK, LQ & LL SIZES



SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	
HL	1.5	in	3.00	4.79	3.50	2.75	2.25	6.75	3.74	0.47	0.99	3.26	5.07	1.19
		mm	76.2	121.7	88.9	69.9	57.2	171.5	95.0	11.9	25.1	82.8	128.8	30.2
K KK	2	in	5.12	8.06	5.50	4.00	2.75	9.25	4.08	0.53	1.42	2.94	9.37	1.75
		mm	130.0	204.7	139.7	101.6	69.9	235.0	103.6	13.5	36.1	74.7	238.0	44.5
LQ	2.5	in	7.19	10.40	7.00	4.38	4.00	10.00	5.47	0.53	1.42	3.50	9.03	1.75
		mm	182.6	264.2	177.8	111.3	101.6	254.0	138.9	13.5	36.1	88.9	229.4	44.5
LL	3	in	7.19	10.40	7.00	4.38	4.00	10.00	5.47	0.53	1.42	3.50	9.03	2.25
		mm	182.6	264.2	177.8	111.3	101.6	254.0	138.9	13.5	36.1	88.9	229.4	57.2

SIZE		O	P	R	S	T	U	V	W ①	X	Y	Z	AA
HL	in	0.56	0.75	10.44	13.26	1.63	0.75	.19 x .09	3.10	0.63	0.50	0.00	10.79
	mm	14.2	19.1	265.2	336.8	41.4	19.1	4.83 x 2.29	78.7	16.0	12.7	0.0	274.1
K KK	in	0.62	0.70	14.14	18.14	2.25	1.12	.25 x .12	8.99	0.63	1.25	5.46	11.10
	mm	15.7	17.8	359.2	460.8	57.2	28.4	6.35 x 3.05	228.3	16.0	31.8	138.7	281.9
LQ	in	0.62	0.63	15.63	19.63	2.25	1.12	.25 x .12	9.03	0.63	1.50	5.32	10.75
	mm	15.7	16.0	397.0	498.6	57.2	28.4	6.35 x 3.05	229.4	16.0	38.1	135.1	273.1
LL	in	0.62	0.63	15.63	20.12	2.25	1.12	.25 x .12	9.03	0.63	1.50	6.00	10.75
	mm	15.7	16.0	397.0	511.0	57.2	28.4	6.35 x 3.05	229.4	16.0	38.1	152.4	273.1

① HL valve poppet perpendicular to shaft. See page 420.3 for example.

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## NPSH REQUIRED

### Performance Curves:

Ammonia pump performance curves are not shown on the Pump Selector on [www.vikingpump.com](http://www.vikingpump.com). Use the performance curves on the following pages.

### NPSH (Net Positive Suction Head):

The NPSH<sub>R</sub> (Net Positive Suction Head Required by the pump) of the Viking Series 4924A Refrigeration Ammonia pumps is a minimum of 4'. An NPSH<sub>A</sub> (Net Positive Suction Head – Available in the system) of more than 4' is desirable for smooth, trouble-free operation particularly at maximum speeds and/or at temperatures below -20°F (-29°C).

For a complete explanation of NPSH, refer to Viking Application Data Sheet AD-19.

The schematic at right depicts a typical accumulator, piping and pump arrangement.

### SUCTION LINE SIZE:

It is recommended that the suction line size be one pipe size larger than the pump port.

### INSULATION:

The suction line from the accumulator must be well insulated so that the heat pickup is held to a minimum.

### REFERENCE:

Refer to Viking Application Data Sheet AD-2 and Viking Technical Service Manual TSM 420.1 for more detailed information on liquid ammonia applications.

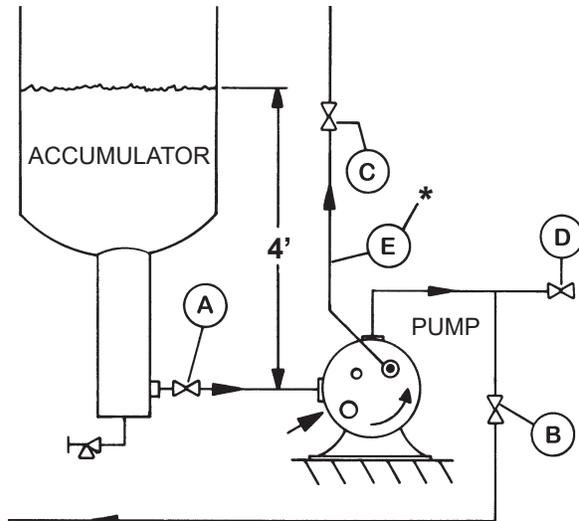
### MECHANICAL EFFICIENCY:

The Mechanical Efficiency (expressed in percent) can be calculated using the following formula:

$$\text{Mechanical Efficiency} = \frac{(\text{Differential Pressure, PSI}) (\text{Capacity, GPM}) (100)}{(\text{Horsepower, BHP}) (1715)}$$

### METRIC CONVERSION:

The following table has been compiled for conversion to metric values.



Schematic of Piping and Valves for a Liquid Ammonia Recirculating Pump in a Refrigeration System

\* This segment of line ⑤ between the return-to-tank pressure relief valve and the shutoff valve ③ should include a pressure relief valve vented to a safe area.

### LEGEND:

- Ⓐ Inlet (suction) side shutoff valve
- Ⓑ Discharge side shutoff valve
- Ⓒ Shutoff valve in return line from the relief valve to the accumulator
- Ⓓ Vent (purge or bleed) valve
- Ⓔ Return line from pump mounted return-to-tank pressure relief valve to the accumulator

VACUUM		PRESSURE		CAPACITY	
In - Hg (Inches of Mercury)	kPa* (Kilopascals)	PSI (lb / in <sup>2</sup> )	kPa* (Kilopascals)	GPM (US Gal / Minute)	L / min (Liter / Minute)
1	3.4	1	6.9	1	3.8
5	17	25	172	0.26	1
10	34	50	345	---	---
15	51	100	690	---	---
20	68	150	1034	---	---
25	85	200	1379	---	---
---	---	250	1724	---	---

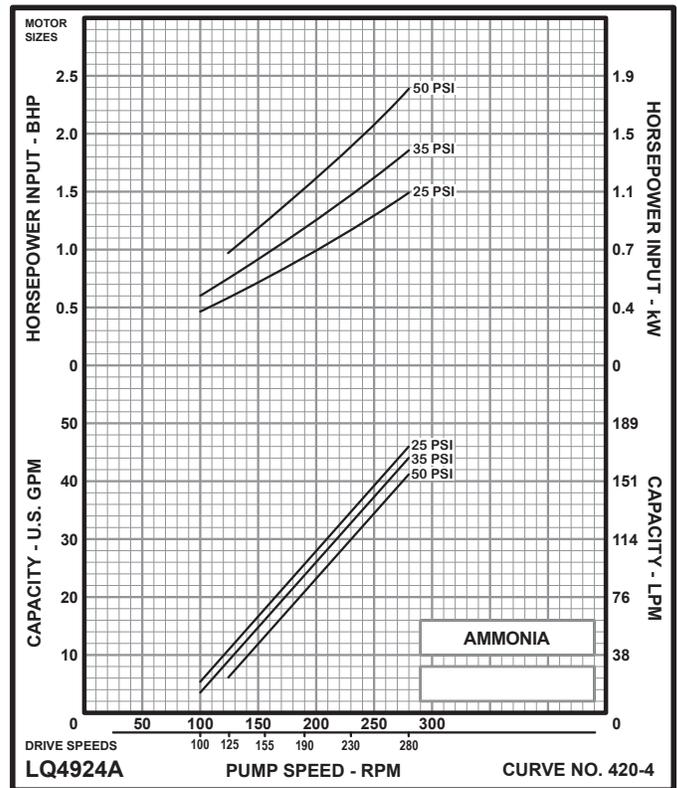
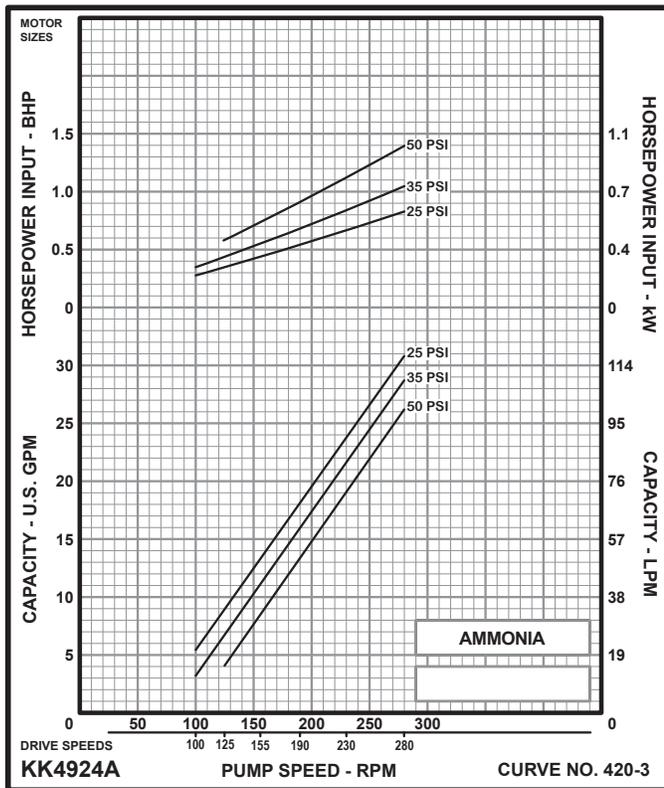
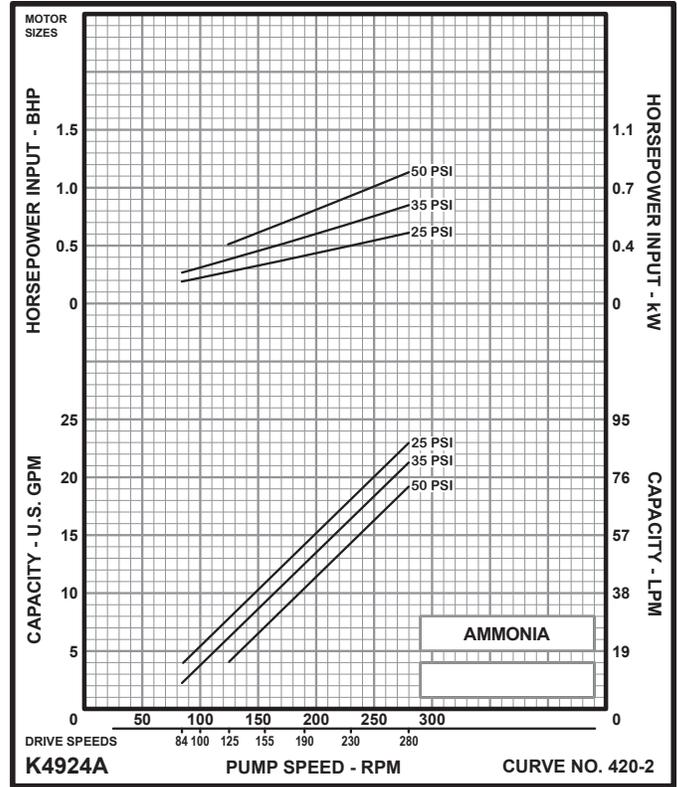
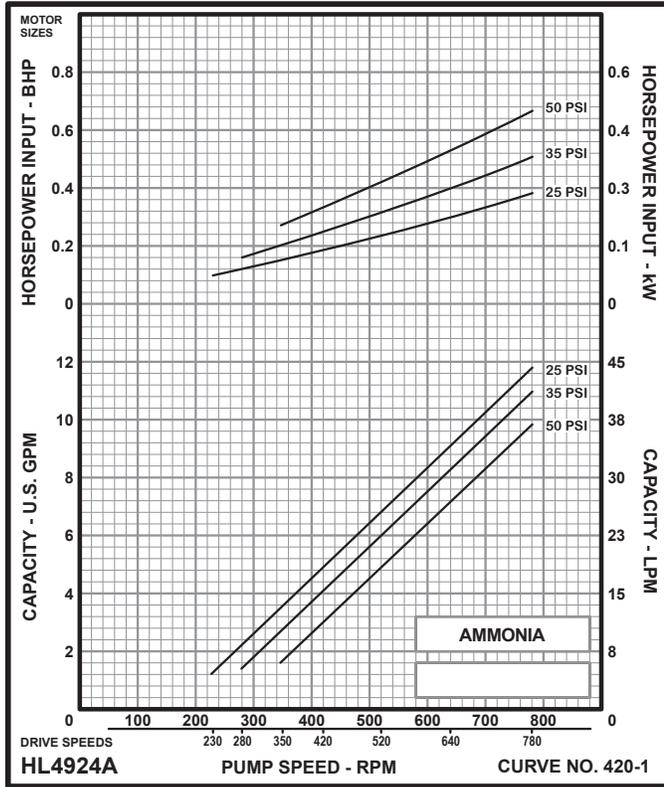
\* 100 kPa = 1 bar

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## PERFORMANCE CURVES – HL, K, KK, LQ SIZES



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**PERFORMANCE CURVES – LL SIZE**

