Linde Hydraulics 21 Degree Technology

Systems and Components for the 21st Century Sold and Serviced Worldwide

Linde Hydraulics: A Tradition Of Leadership

Welcome to the next generation in hydraulic component and systems technology. Linde is proud to usher in a new era of hydraulics with our advanced 21 Degree Technology series of pumps, motors and related products. With this latest technology, Linde, a world leader in the design, manufacture, and application of hydraulic components and systems since 1958, continues to pursue its position of excellence.

Linde, unlike most hydraulic component producers, is also an equipment manufacturer. Linde is the world's largest hydrostatic drive Lift Truck manufacturer. Our Lift Trucks are renowned for long service life, controllability and ease of use.

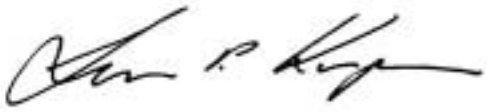
The need for heavy duty, precisely controlled components is well known to us. Continued market pressure demands better products, simpler designs and reduced manufacturing costs.

Our new 21 Degree Technology series of products defines the state of the art in hydraulic component design. They were designed to meet the demanding market needs that we as equipment manufacturers are constantly faced with. Whether material handling or processing or equipment manufacturers, we all have these basic requirements:

- *Performance*
- *Reliability*
- *Ease of Service*
- *Controllability*
- *Ease of installation*
- *Inventory Control*

Linde's new 21 Degree Technology products help meet these needs, but more importantly, they've undergone testing no other hydraulic component manufacturer can match! Linde's Lift Trucks and their reputation for performance, reliability, and endurance depend on it, and you can too.

You will see the 21 Degree Technology Logo on all products or literature that reflect this new technology. As you review this brochure showcasing Linde's advanced products, remember, Linde Hydraulics is not just a component manufacturer. We, like yourselves, are makers of equipment designed to distinguish itself from its competitors. We look forward to working with you.



Lewis Kasper, President Linde Hydraulics Corporpoation

Open Or Closed Loop Systems

Linde Technology spans both open and closed loop systems, allowing us to provide the best operating system for your needs. Typically suited for heavy duty/high cycle applications, the family of Linde components is designed with both manufacturers and end users in mind.

Hydraulic Motors

Advanced 21 Degree Technology designed rotating groups allow these motors, fixed or variable displacement, to perform as well or better than their bent axis design counterparts. They are smaller, lighter and capable of tremendous rates of speed change and they are built with Linde's proven reputation for long, heavy duty service.

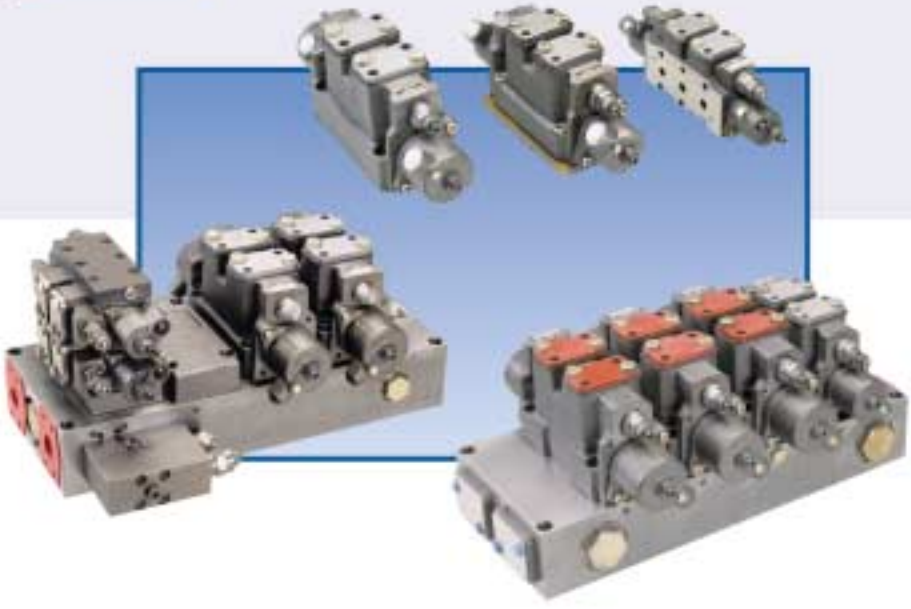
Hydraulic Pumps

Like the motors, the HPR Open Loop and HPV Closed Loop Pumps employ 21 Degree Technology.

They share many of the same parts, a real plus in controlling burgeoning inventory costs. This compact design with a full range of interchangeable controls increases application flexibility and versatility.

Linde Synchron System

The Linde Synchron System is capable of duplicating the performance of individual pumps for each machine function. If your equipment requires the simultaneous operation of two or more functions, this flexible system, used in conjunction with the HPR Open Loop pumps, is a good choice for a high-performance, user-friendly operating system.



Redefining State-Of-The-Art

Added benefits to 21 Degree Technology designed pumps and motors are space and weight savings. Linde's design engineers know the value of space-to-weight relationships. In today's and tomorrow's equipment, smaller, lighter, components are easier to install and service. These pumps and motors are significantly smaller in size (see Figure 2) yet they feature the same power ratings, making their power-to-weight ratios the highest in the industry. Smaller and lighter units are easier to install and service.

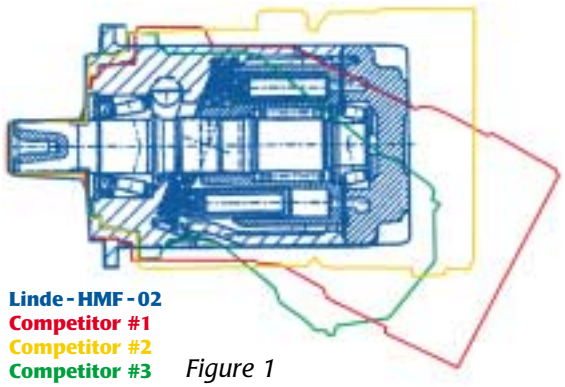


Figure 1

MOTORS

		HMF												HMV/R							
		cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev
		28	1.70	35	2.12	50	3.06	75	4.57	105	6.40	135	8.23	55	3.36	75	4.57	105	6.40	135	8.23
Pressure Ratings in PSIG	1	Nominal 5000 Maximum 6090 Peak 7250																			
Rated Speed Max Disp	2	4500		4500		4200		3800		3500		3200		4000		3700		3300		3000	
Rated Speed Min Disp	3	–		–		–		–		–				5000		4600		4100		3700	
Envelope Size	4	L 7.4 W 6.4 H 5.8		7.4 6.4 5.8		7.9 7.9 6.1		9.0 7.9 6.7		10.0 7.9 7.2		10.9 9.8 7.5		9.0 8.0 9.2		9.5 8.2 9.8		10.5 8.2 9.8		11.3 10.1 10.7	
Weight	5	35.2		35.2		39.6		55.0		70.4		83.0		75		71.0		73.0		125.0	
HP Rating Cont	6	70.0		88.0		117.0		161.0		205.0		241.0		107.0		161.0		205.0		241.0	

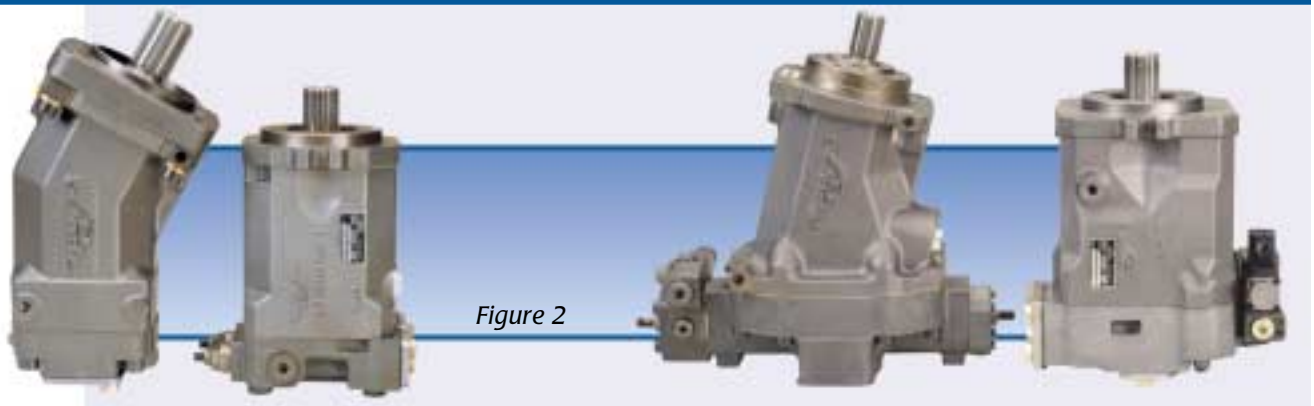


Figure 2

PUMPS

		HPR										HPV							
		cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev	cm3/rev	in3/rev
		55	3.36	75	4.57	105	6.40	135	8.23	105D	12.8	55	3.35	75	4.57	105	6.40	135	8.23
Pressure Ratings in PSIG	1	Nominal 5000 Maximum 6090 Peak 7250																	
Rated Speed Max Disp	2	2600		2600		2300		2300		2300		3500		3200		2800		2600	
Rated Speed Min Disp	3	CF		CF		CF		CF		CF		CF		CF		CF		CF	
Envelope Size	4	L 9.0 W 7.9 H 9.2		9.8 7.9 9.2		11.0 8.2 9.9		11.9 10.1 10.6		14.1 9.6 11.2		10.7 11.5 10.5		11.5 12.2 11.2		12.4 13.8 11.5		14.4 13.9 12.0	
Weight	5	75.0		76.0		110.0		128.0		194.0		76.0		95.0		128.0		165.0	
HP Rating Cont	6	107.0		110.0		135.0		163.0		257.0		107.0		135.0		164.0		196.0	

CF = Consult Factory

Performance By Design

The new family of 21 Degree Technology components represents a real breakthrough in hydraulic component design. The heart of these new products (in Figure 3) is a 21 degree rotating group made possible by a new piston/slipper design (A). Higher swivel angles than previously thought possible or practical are the result. The new 21 degree rotating group is common to both pumps and motors, reducing inventory requirements for units and replacement parts. This results in fewer part numbers to inventory.

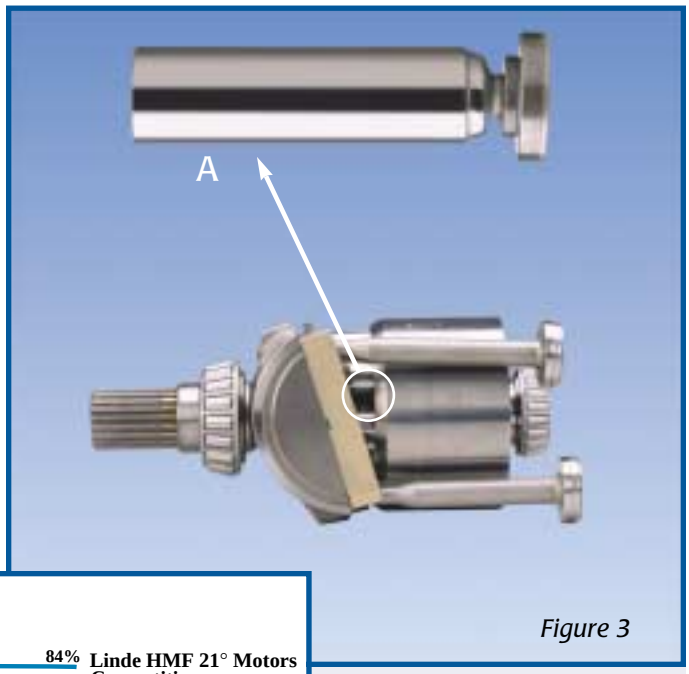


Figure 3

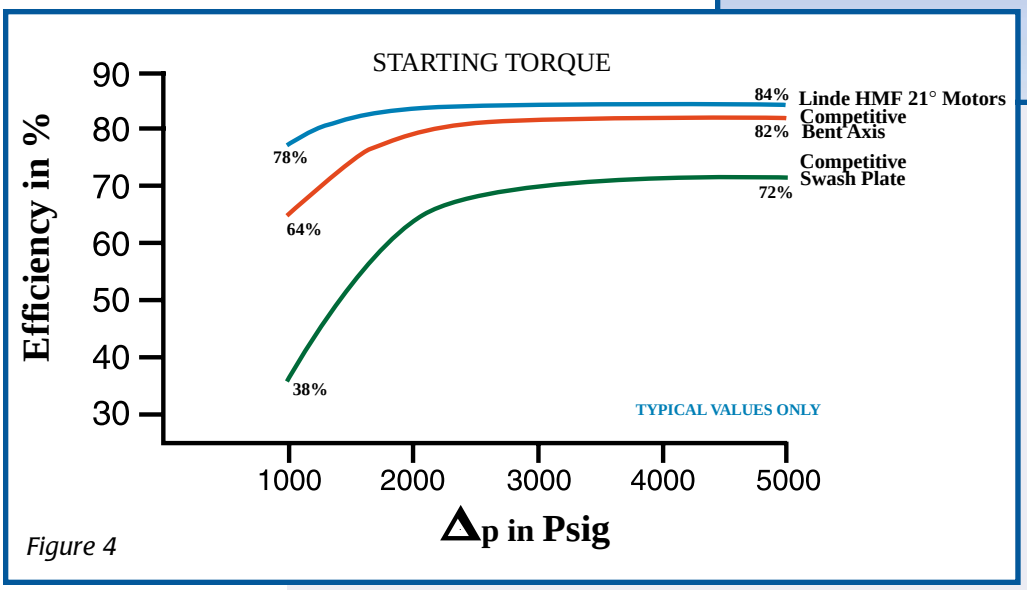


Figure 4

As you can see from the curves (figure 4) the new HMF/HMV/HMR Motors are every bit the equal of their bent axis rivals in torque performance. They also feature very low torque ripple, high speed capability, high rates of acceleration or deceleration, and a 3 to 1 plus displacement ratio on variable units.

	SYNCHRON DIRECTIONAL CONTROL VALVES				
	VW14	MW14	VW18	MW18	VW25
Nom. Flow Rating-GPM 1	25	25	50	50	90
Min. Flow (Metering Limit in GPM) 2	.10	.10	.15	.15	.20
Pressure Rating PSIG 3	6000	6000	6000	6000	6000
Mounting 4	Subplate	3 Spool Mono Block and/or Sandwich Style	Subplate	3 Spool Mono Block and/or Sandwich Style	Subplate
Control 5	Hyd. Pilot	Hyd. Pilot	Hyd. Pilot	Hyd. Pilot	Hyd. Pilot
Torque Control Available 6	Yes	—	Yes	—	No
Aux Port Valves 7	Yes	Yes	Yes	Yes	Yes

Linde Hydraulics Is...

Component Technology

Linde Hydraulics components define the state of the art in basic design and power-to-weight ratio. Backed by demanding research and testing programs, Linde components have a reputation for long, reliable service.

Control Technology

Over the years, Linde Hydraulics' reputation for meeting demanding and reliable control needs has been proven time and again. Controllability is what distinguishes any vehicle, machinery, or device. Controllability defines the equipment's safety, ease of use and ultimately its productivity. At Linde Hydraulics, we understand that. You can count on Linde to provide the best system controls.

Systems Technology

The Linde Edge - Single or dual path closed loop systems, open loop systems, or the SYNCHRON Control Systems, Linde's experienced staff is there to help you make the best choice to meet your design goals.

Inventory And Distribution

The backbone of Linde's market coverage team is its network of stocking distributors. This team of professionals has years of experience in fluid power to draw upon. They have Linde trained professionals, inventory and your needs in mind.

Worldwide Service Support

Linde offers a worldwide network of trained factory and dealer personnel. Training programs are held regularly, and specially tailored product classes can be developed for specific applications. A network of Certified Service Centers with support inventory is ready with qualified professionals when you and your customers need it.

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